

Six Cases

- I. Carcinoma of the Prostate.
- II. Duodenal Ulcer.
- III. Haematuria.
- IV. Carcinoma of the Breast.
- V. Carcinoma of the Rectum.
- VI. Burns.

Submitted for

The Pattison Prize in Clinical Surgery.

1949.

J. Reid Brown,



In these six cases which I have put forward, I feel that though they are representative of the disease or complication of the disease, they contain also certain interesting points.

I have seen all these cases during my terms of clinical surgery, or during my vacations in Wards 5 and 6 of the Royal Infirmary, Edinburgh. Of the cases, I have seen four of them fully from the time of admission till they left the hospital and for a period of time after the time in hospital. (cases II, IV, V, VI.). Of the other two cases I have only seen them for three-quarters of the case.

I would like to acknowledge the kind permission of Mr. R. L. Stewart, and Mr. J. A. Ross, for the use of the cases and also the x-rays.

J. R. B.

CASE. NO. I.

A CASE OF CARCINOMA OF THE PROSTATE.

ITS COURSE AND TREATMENT.

Case. No. I.

Name. John Elder.

Age. 61 years.

Occupation. -

Address. 'Wilton Lodge', Hawick.

Doctor. Dr. Simpson, 19, Bridge Street, Hawick.

Admitted. 17th. April, 1946.

Discharged. 7th. May, 1946.

Complaint. Pain in the back, and both hips for seven months.

History.

Present.

The patient states that he was perfectly well till July, 1945, when he developed a dull ache in the bottom of his back, and in both his hips. The pain was fairly continuous, and did not go anywhere else.

For the past seven months the pain has been more marked in his right hip, and sacro-iliac joint. It is still aching in character, but now tends to radiate down the back of his legs. He received physiotherapy for his backache but there was no improvement.

For the past four months he has had frequency of micturition, having to get up at night, and he states that he has some difficulty in initiating the act of micturition. He has never noticed any change in his water or the appearance of blood in it.

His appetite is fair, and his general health quite good. His weight is fairly steady. He has a tendency to constipation, needing to take laxatives at times.

Since the starting of his tablets (stilboestrol) his pains in the back, and down the legs have disappeared.

Past.

Nil.

Social Conditions.

Food and Habits. He is well fed, and lives in good surroundings.

Family. Nil.

State on Examination.

Intelligence. Good.
Development. Good.
Muscularity. Good.
Nutrition. Good.

General Appearances.

He is a tallish looking man. He is pale and anaemic looking, and appears rather miserable. He looks his age. He is fairly well developed, and co-operates to a reasonable degree.

Temperature.

This was 98 degrees F. on admission.

Pulse.

This was 76 per minute on admission.

Respiratory Rate.

This was 20 per minute on admission.

Blood Pressure.

Systolic Pressure. 140 mms. Hg.
Diastolic Pressure. 90 mms. Hg.

EXAMINATION OF SYSTEMS.

Urinary System.

Micturition.

The patient has for the past four months had difficulty in initiating the act of micturition. For the same period of time, he has had frequency of micturition, having to get up at night. There appears to be no other urinary complaint. No pain, or any difference in his stream, or any change in his water.

Palpation.

The kidneys are not palpable, and no tenderness is found.

Urine.

Spec.	Grav.	React.	Colour.	Alb.	Sugar.	Acet.
1017.		Acid.	Yellow.	-	-	-

Microscopic. Negative.

Special examinations on the Urinary System were carried out and will be reported on later.

Locomotory System.

There are no reports on this system even though the patient's symptoms were referable to it, and I am thus unable to give any accurate account of it.

Circulatory System.

Dyspnoea. He is not breathless.

Palpitations. None.

Pain. None.

Faintness. None.

Headaches. None.

Arteries.

Pulse. On admission it was 76 per minute.

Rhythm. Average.

Force. Medium.

Systolic. Average.

Diastolic. Average.

Nature of the vessel wall. Not palpable.

Nature of the pulse wave. Regular

Blood Pressure.

By use of the Sphygmomanometer:-

Systolic Pressure. 140 mms. Hg.

Diastolic Pressure. 90 mms. Hg.

Veins. No abnormality.

Capillaries.

There is no cyanosis, or dropsy.

Heart.

Form of the Preacordium.

No abnormalities.

Pulsations.

None either in the Epigastrium, upper part of the Sternum, or in the Neck.

Palpation.

The apex beat lies on the 5th. rib on the mid-clavicular line. There are no thrills present.

Percussion.

On percussion the heart showed no enlargement.

Auscultation.

Mitral.	All the heart sounds
Tricuspid.	are easily heard, and
Aortic.	are quite normal. There
Pulmonary.	are no murmurs.

Rate of the heart.

Average.

Rhythm.

Regular.

The pulse is present.

Respiratory System.

Cough. None.

Expectoration. None present.

Haemoptysis. None.

Breathlessness. None.

Pain. None.

Signs.

Breathing.

Rate. This was 20 per minute on admission.

Type. Abdominal-Thoracic.

Rhythm. Regular.

Sputum. None.

Thorax.

Inspection. The chest is fairly well covered. It is somewhat longer than the average chests. There are no local or general departures from normal.

Palpation. Movements are equal on both sides, and are of a good expansion. Vocal Fremitus is equal on both sides.

Percussion. The note was resonant, and equal in all areas.

Auscultation.

Breathsounds. Vesicular.

Accompaniments. Nil.

Vocal Resonance. Equal on both sides.

Haemopoietic System.

No glands are palpable.

Spleen. It is not enlarged.

Alimentary System.

Appetite. His appetite has only now become fair.

Thirst. None.

Dysphagia. He has no difficulty in swallowing.

Pain. None.

Feeling of weight. None.

Distension. None.

Flatulence. None.

Heartburn, Waterbrash, Nausea. None.

Vomiting. None.

Action of the Bowels. These are rather inclined to constipation and he has to take laxatives at times to get a satisfactory motion.

Weight. This is fairly steady.

Signs.

Lips. These are red in colour, and moist.

Tongue. It is clean and moist.

Abdomen. General.

The abdomen is fairly well covered. There are no abnormalities on inspection, and the movements on respiration are equal.

Palpation.

There is no rigidity or tenderness of the abdomen.
The liver is not enlarged.

Percussion. Nil.

Auscultation. Nil. Normal abdominal sounds heard.

Rectal Examination.

The prostate is markedly enlarged, and is hard, and nodular in consistence. The enlargement is more marked on the right side than on the left.

No other abnormality was found.

Endocrine System.

Pancreas. Nothing abnormal. Urine- sugar free.

Thyroid. It is of average size, and consistence. There are no pulsations present.

Parathyroid. There is no tetany present, and no signs of changes in the bones referable to the parathyroid.

Suprarenals. No symptoms or signs connected with the Suprarenals.

Pituitary. No abnormalities present.

Integumentary System.

No abnormality discovered.

Reproductive System.

The Prostate gland is enlarged, firm, and nodular. The enlargement is more marked on the right side than on the left.

No other abnormality is found.

Nervous System.

Mental Function.

Good. There are no abnormalities.

Cranial Nerves.

No abnormality.

Reflexes.

Superficial.

Abdominal. Present.

Plantar. Present. Flexor.

Deep.

Nil.

Special Examination.

Cystoscopic Examination.

Mr. T.I. Wilson.

Out-patient.

20th. March, 1946.

Urological Report.

Cystoscopic Examination. A 2IF Cystoscope was passed with slight difficulty at the prostatic urethra. 6ozs. clear residual urine withdrawn. Bladder filled, capacity normal. On viewing the interior, there is slight generalised congestion of the bladder mucosa in all areas with early trabeculation of the underlying musculature. At the bladder neck the contour is irregular, there being nodular encroachment of the lateral lobes on the internal meatus, more marked on the right side than on the left. The middle lobe of the prostate is considerably enlarged, and irregular in outline bulging upwards forming a retroprostatic pouch and obscuring both ureteral orifices.

X-ray report.

40950

Pelvic Floor. No abnormality seen in the pelvic floor. The bones of the pelvis show in them one small area of sclerosis in the right pubic bone, and the upper margin of the pubis on this side is not very clearly outlined. On the right of the sacrum there would appear to be an erosion of the bone in the region of the fourth sacral segment.

40951

Renal Region. No abnormality is seen in the renal regions. Both renal outlines are normal in situation and contour. There is some osteoarthritis of the lumbar spine, and the lumbar sacral articulation on the right side, there is some irregularity of the bone margin of the fifth lumbar vertebrae. No other abnormality is noted.

Bacteriological
report.

Bladder. A few epithelial cells, no organisms or growth.

Conclusion.

Carcinoma of the Prostate. The x-ray appearances are strongly suggestive of bony secondaries.

X-ray Examination. These were carried out on the patient in another ward, before the patient was referred to Wards 5 and 6.

12th. March, 1946.

Lumbar spines and Pelvis.

There is some osteoarthritic changes in the lumbar spines. There is no evidence of prostatic metastases, but there is a doubtful area of possible bone destruction in the region of the left ala of the sacrum. A further view of the sacro-iliac joints would be advised.

20th. March, 1946.

These were included in the Cystoscopic examination.

From these findings a diagnosis of Carcinoma of the Prostate was made. The patient was admitted for operation.

Pre-operative examination and treatment.

The patient was placed on Stilboestrol Therapy, the dosage being three five mgm. tablets per day. This was done before he was admitted to the ward, and was still an out-patient.

19th. April, 1946.

Blood Urea Nitrogen. 10 mgm%. Van Slyke method.

Premedication.

Omnopon. gr 1/3.

Atropine. gr 1/100.

By subcutaneous injection.



X-ray Report. Ist. May, 1946.

Lumbar Spines and Pelvis.

Lumbar Spines. Apart from osteoarthritic changes, it is negative.

Pelvis. There is definite destruction of the Ala of the Sacrum of the left side.

The process is partially osteolytic and partially osteoplastic.

Progress after Operation.

23rd. April, 1946. The patient's condition at the end of the operation was satisfactory. He was having his bladder washed out at hourly intervals with 1/1000 AgNO₃.

24th. April, 1946. The bladder washout was now two hourly.

1st. May, 1946. Acid Serum Phosphatase. 1 unit. King.

X-ray report. Lumbar Spines and Pelvis. There is now quite definite destruction of the Ala of the sacrum of the left side. The process is partially osteolytic and partially osteoplastic.

Lumbar Spines. - apart from osteoarthritic changes
- negative.

7th. May, 1946. The patient had made very satisfactory progress after his operation and was discharged on this date. He still carried on with the Stilbeostrol therapy.

18th. June, 1946. Cystoscopic Examination.
Out-patient.

Mr. R.L. Stewart.

Urological Report.

Punch resection of bladder neck on the 23rd. April, 1946
Satisfactory recovery. The patient has been on Stilbeostrol since taking two five mgm. tablets in the day. He is active, and well, apart from some discomfort in the back. His bladder function is very satisfactory.

P.R. The left lobe of the prostate is soft, and seems to be contracting, while there is still some thickening of the right side though not really hard.

Cystoscopic Examination.

A 2IF. cystoscope passed quite easily into the bladder. There was a small amount of clear urine. Bladder filled - capacity 280cc. Appearances. There was no cystitis and the bladder walls were very healthy. At the bladder neck the area of resection was perfectly healed with quite a deep groove. The margins were perfectly regular. Elsewhere round the neck the prostatic tissue was slightly prominent but not irregular. Anteriorly there was a fairly wide V meeting of the lobes.

Straight x-rays taken.

X-ray report. 4I690. Straight x-ray of Pelvis.

The left half of the sacrum adjacent to the sacro-iliac joint compared with the previous x-rays, shows what might be taken as some bone regeneration. There is certainly no further evidence of destruction.

4I691 Lumbar spines. This showed nothing special.

Bacteriological Report. Bladder. No cells or organisms or growth.

Conclusion. Clinically this man is very well indeed. Cystoscopically one has noted perfect healing at the site of the punch prostatectomy. There is no infection and the x-rays suggest that there is some consolidation occurring at the site of previous destruction in the left half of the sacrum. Treatment by stilboestrol should continue and there is no indication at all meantime for any further punching out of the bladder neck.

22nd. October, 1946.

Cystoscopic Examination.

Out-patient.

Mr. T.I. Wilson.

Urological Report.

Punch resection of bladder neck, 23rd, April, 1946. Satisfactory recovery. Last examined 18th, June, 1946. Stilboestrol administration continued. Two five mgm tablets daily. General health very satisfactory. Occasionally rises once at night, frequently not at all. Bladder function satisfactory. Occasional slight ache in the back after sitting for a period. P.R. The left lobe of the prostate is much smaller than formerly. The right lobe is still firm and irregular, and fixed, but it does not appear to have enlarged.

Cystoscopic Examination.

A 2IF cystoscope passed. 4oz. residual urine withdrawn. Urine clear. Bladder filled capacity - 300cc +. On viewing the interior the bladder mucosa and musculature are healthy. At the bladder neck there is a good posterior groove, the slope of which is gradual and constant. Anteriorly and laterally at the meatus the prostatic tissue shows an undulating surface. The irregularity is not gross, and anteriorly the V does not appear to have narrowed. Straight x-rays taken.

X-ray report. 42589. Pelvic floor itself shows no abnormality nor do the bones of the pubis. The sacrum is not clearly visualised.

42598. Renal regions. The bones of the spines show no abnormality. There is osteoarthritic lipping of lumbar 3 and 4. The decalcified area in the sacrum appears to be largely recalcified although there is still evidence of irregularity at the level of the third sacral segment. There is an irregular shadow now seen involving the promontory and left sacral ala, and the contiguous portion of the left ilium. This shadow is irregular in density and in outline but in its lateral portion its upper margin appears to coincide with the posterior part of the crest. The whole of the promontory and first sacral segment appears to be involved

Bacteriological Report. Bladder. Some epithelial cells, and a number of gram negative bacilli but no growth was obtained.

Conclusion. The carcinoma of the prostate appears to have locally regressed somewhat although fixation and induration of the right side is still marked. Cystoscopically there is good gutter posteriorly. In the bones of the pelvis the appearances are strongly suggestive of metastatic deposits involving it and is sclerotic in type and although calcification appears to have taken place in the region of the previously noted sacral metastasis, erosion is still present in the medial side of the deposit.

28th. February, 1947. The patient is very well. He has no pain. There is a little stiffness in his back. He is now working regularly. The prostate is reduced, except for one little area of induration. Apart from this, you would say that it was normal. The superior margin is pretty well defined.

3rd. March, 1947. Acid Serum Phosphatase. I unit. King.

X-ray report. Pelvis. The appearances have changed considerably since the last examination, and there are now deposits of osteoplastic type involving the upper part of the sacrum, and the left iliac bones, at sites where osteolytic deposits were previously noted. There are also osteoplastic deposits in the right ilium, below the crest posteriorly. The present appearances are typical of deposits from carcinoma of the prostate.



X-ray Report. 31st. March, 1947.

Pelvis.

The appearances have changed considerably since the last examination, and there are now deposits of osteoplastic type involving the upper part of the Sacrum, and the left Iliac bones at the sites where osteolytic deposits were previously noted. There are also osteoblastic deposits in the right Ilium, below the crest posteriorly. The present appearances are typical of deposits from a carcinoma of the Prostate.

- 31st. March, 1947. The patient has no pain. He has slight discomfort in the back. He has a good stream. P.R. the prostate does not appear enlarged now, and would appear to be within normal limits.
- 31st. July, 1947. The patient states that his back is very stiff, but he has no pain. He has a good stream. He is to have one month without stilboestrol. The prostate is about the same. The testes are small in size. He looks just a little bit puffy.
- 27th. August, 1947. He feels very fit. He is at work and is passing his urine normally. There is a slight stiffness in the back, but no pain. The prostate feels practically normal apart from small hard area to the right of mid-line. He has discontinued stilboestrol for one month.
X-ray report. Lumbar spines and Pelvis. The appearances are similar to the report of the 31st, March, 1947.
- 8th. October, 1947. The patient is getting very tired easily. He has no urinary symptoms. There is no pain in the back but a little stiffness. P.R. The right lobe is hard but not grossly fixed.
- 19th. November, 1947. His back is very stiff, and he complains of pain in the left lumbar area. He has no pain in his legs. The movements of his legs are full and free. There is nothing palpable in the abdomen. The bladder is not distended. P.R. the left lobe is normal. while the right lobe is enlarged, and hard.
The patient was again placed on stilboestrol.
X-ray report. There is a minor degree of osteoarthritic lipping in the lower lumbar spine, but no evidence of metastases. There is however destruction of the ala of the sacrum on the left side as previously reported but a further film of the pelvis would be necessary to demonstrate any change in the appearances.
- 18th. February, 1948. The patient had no urinary symptoms. The right lobe of the prostate was hard, nodular and fixed.
- 28th. April, 1948. The patient appeared well. Acid Serum Phosphatase. 3 units. King.
X-ray report.
Lumbar spines. Osteoarthritic changes are present as previously noted in the lower lumbar spines. There is no definite evidence of metastases but the lower margins of the fifth lumbar vertebrae as seen in the posterior view is suspicious.



X-ray Report. 28th. April, 1948.

Lumbar Spines. Osteoarthritic changes are present as previously noted in the lower lumbar spines. There is no definite evidence of metastases, but the lower margin of the fifth lumbar vertebrae as seen in the posterior view is suspicious.

Pelvis. There is an increase in the metastatic involvement of the Sacrum, and of the adjoining Ilium on both sides, more extensive on the left side, and on this side the destruction of the sacrum is considerably more obvious than that on the 27th. August, 1947. The deposits are of both osteolytic and osteoplastic types.

Pelvis. There is an increase in the metastatic involvement of the sacrum, and of the adjoining ilium on both sides more extensive on the left, and on this side the destruction of the sacrum is considerably more obvious than that on the 27th. August, 1947. The deposits are of both osteolytic and osteoplastic type.

- 28th. June, 1948. The patient has no urinary trouble at all. He has no real pain in the back. His testes are very small and soft. There is a little pain in the left breast. P.R. The prostate is no longer nodular and just fibrous to the touch. The stilboestrol was reduced to one tablet per day for one month.
- 7th. September, 1948. The patient complains of pain in the lower part of the back. He was started on his stilboestrol twice a day again.
- 8th. September, 1948. X-ray report. Sacro-iliac region. Compared with the films 28th. April, 1948, the appearances are essentially unchanged.
- 15th. September, 1948. He feels better after the stilboestrol twice a day. Urination is normal and he is at full work. P.R. The prostate feels practically normal apart from its hardness.
- 19th. January, 1949. The patient complains of pain in both his legs. His urination is good. P.R. the prostate is small and atrophied.



X-ray Report. 8th. September, 1948.

Sacro-iliac region.

Compared with the films of
28th. April, 1948, the appearances
are essentially unchanged.

Pathological Report.

Issued. 30th. April, 1946.

John Elder.

' Pieces of Prostatic Tissue '.

The specimen consists of several small pieces of prostatic tissue, all showing microscopically, infiltration by carcinoma. It is poorly differentiated, rather scirrhou, adeno-carcinoma. The tumour shows no regressive changes which one could attribute to stilboestrol treatment, but there is a surprising absence of mitotic figures, which seems compatible with an arrest of growth by this treatment.

Differential Diagnosis.

The differential diagnosis in a case of Carcinoma of the Prostate includes the following diseases:-

- Calculus of the Prostate.
- Prostatitis.
- Tuberculosis of the Prostate.
- Simple Hypertrophy of the Prostate.
- Carcinoma of the Prostate.
- Carcinoma of the Bladder.
- Carcinoma of the Rectum.
- Fibrositis.
- Lumbago.
- Osteo-arthritis.
- Prolapsed Disc.
- Sciatica.
- Tabes Dorsalis.
- Spondylitis Deformans.
- Sacro-coccygeal tumour.

Calculus of the Prostate.

This condition occurs when there is a deposition of calcium salts in the prostate. The patient shows frequency of micturition, terminal haematuria, and pain referred along the urethra. The prostate feels hard and nodular, the nodules being shown as deposits by x-ray. Differentiation of these nodules can be finally done by pathological examination.

Prostatitis.

This may be acute or chronic. The acute is a common complication of gonorrhoea, usually occurring during the second or third week. There is a discomfort in the perineum, which becomes severe pain as the tension in the capsule increases. At first there is a constant desire to micturate, but later retention occurs.

The chronic often occurs as a complication of fibrous stricture of the urethra. The disease is commoner after thirty, and frequently of insidious onset. At first the glandular tissue is affected, but later the stroma is affected, and the gland can be felt to be hard, enlarged and nodular, often only one lobe, being markedly affected. The patient complains of a dull pain in the perineum, with pain along the penis. There is often frequency of micturition, and perhaps haematuria. Where there is marked fibrous change there may be retention. The diagnosis may be made from the history.

Tuberculosis of the Prostate.

This never a primary condition, but secondary to some other lesion elsewhere. It is usually in a young adult, and there are symptoms of some frequency and pain on micturition, and perhaps haematuria. There is also a sense of discomfort in the perineum. There may be rectal signs as well showing irritation of the rectum. The prostate on examination is hard, craggy and irregularly nodular, while areas of softening or actual fluctuation may be detected.

Simple Hypertrophy of the Prostate.

This is a condition which usually appears about the age of fifty in man. In the early stages the chief feature is an increased frequency of micturition, due to derangement of the reflex of micturition by the enlarged prostate. Later the patient complains of some difficulty in starting the act of micturition, and his stream becomes less, while later there may be precipitancy of the act. Haematuria may occur due to congestion of the urethral mucosa. On examination the prostate shows that it is smooth, uniform, firm or elastic, movable and well-defined. No enlargement is palpable if the urinary symptoms are due to the middle lobe, alone, median bar or a fibrous prostate. The patient may also show secondary effects from the obstruction caused by the prostate to micturition, and these are retention and its effects. The final diagnosis if not made by the feel of the prostate can be done by the pathology of the prostate.

Carcinoma of the Prostate.

This condition may start in a prostate which is already showing signs of a simple enlargement, or it may start by itself. The patient is usually between forty to sixty years of age. He complains of the same signs already stated for the simple hypertrophy above. However sometimes the symptoms are not related in any way to the prostate, and the patient does not give any story of prostatic trouble at all. He may tell of pain in the back or down the legs when the bones of the pelvis are affected, by secondary deposits in the bones. Deposits in the iliac nodes may cause a swollen leg, and a growth ulcerating into the rectum may give bleeding from the bowel. The patient in this case showed the pains in the back, and down the legs to start, and it was because of these that he received treatment by physiotherapy for them. It was only later that when he showed the urinary symptoms that any guide to his exact trouble was made. There are certain signs shown by the examination of the prostate itself. This may be normal in size, but with one lobe harder in the touch than the other, as though a central nodule is covered by a layer of firm prostatic tissue. Later the vertical median groove felt between the lateral lobes is obliterated. In more advanced stages the mobility of the gland is impaired and enlarged glands may be felt on each side.

The patient showed a very hard prostate which was enlarged and more on the right side than on the left. It was nodular in consistence. These are all points strongly in favour of carcinoma of the prostate. Cystoscopic examination in the case showed the spread of the prostatic tissue, and was also in support of prostatic carcinoma. X-ray evidence at first stated that there were changes in the bones which were metastatic, but later they were decided upon as being those of carcinoma of the prostate type.

Carcinoma of the Bladder.

This usually starts with a painless haematuria, which occurs at intervals. Frequency of micturition occurs, and may be the first symptom, or it may be dysuria. Pain unrelated to micturition may occur, and is sometimes of the referred type characteristic of the nerve involvement. Examination of the prostate can be made which should be negative though in an old person may show some simple hypertrophy. Cystoscopic examination gives a diagnosis.

Carcinoma of the Rectum.

This will come into the picture when there is spread of the tumour into the surrounding tissues, and may cause urinary symptoms, or nerve involvement. However by this time the primary symptoms of carcinoma of the rectum are usually obvious.

Fibrositis.

This condition is an inflammation of the supporting fibrous tissue. It may be A. Muscular. B. Neuritis. In the muscular type the patient gives a history of stooping and he is seized with an excruciating pain in the lumbar region. He is unable to straighten up. The muscles are found to be very hard and tender. Hard nodules may be made out on palpation sometimes. The patient in the case had a dull ache all the time, and when the pain was present, he found that it passed down the leg. He also showed urinary symptoms, and a definite hard enlargement of the prostate, which would not be found in Fibrositis.

Lumbago.

This condition is a Fibrositis when it is only in the Lumbar muscles.

Osteo-arthritis.

This occurs in the joints in the body, and usually about the age of fifty-to sixty years of age. The symptoms are gradual in onset, and the earliest are pain of an aching character appearing after the joint has been used, and stiffness, especially on movement after rest. The patient showed this type of aching symptom, and there were on the x-rays signs of osteo-arthritis shown by lipping of the vertebrae. However though these were present there were also present changes in the bones which pointed to destruction of it, by tumour spread. The patient also showed urinary changes.

Prolapsed Disc.

There is often a history of a sudden strain, or a sensation of something snapping after lifting a heavy weight. There is usually a sudden onset of pain after the trauma, and it is low in the back. It is aggravated by cough. Usually several months pass before there is extension to the leg with sciatic distribution. The diagnosis may usually be made from the history, and symptoms. X-ray may show narrowing of intervertebral space at level of damaged disc, but not invariable and not diagnostic. The patient however did not give any history of trauma, and he also however showed his urinary symptoms and the x-ray features did not point to a prolapsed disc.

Sciatica.

This is a common disease and is of two types. The sciatic nerve is involved at the sciatic notch, or the sciatic nerve roots may be involved at level of intervertebral foramina. The onset may be insidious or acute. The pain may be severe and is referred along the course of the nerve. In the diagnosis of this condition there may be two things. The first is that there may be a neoplasm pressing on lumbar or sacral plexuses, which would be the case where the bone destruction might effect the nerve roots or there was spread of the tumour to the nerve roots. The other way is that it may be a toxic or infective neuritis or traumatic neuritis.

Tabes Dorsalis.

This condition as well as showing the characteristic signs of the disease, may show delay and difficulty in micturition, and retention may occur, due to the sphincters being affected. These symptoms however are only a small part of the trouble.

Spondylitis Deformans.

This condition usually occurs from early adult life to middle age. There is a gradual progress, with intermissions, to complete ankylosis of spine and large joints. Pain is severe in the early stages, due to attempted movements. The diagnosis is simple in late stages.

Sacro-coccygeal tumour.

These are mainly chordomas, and the tumour infiltrates widely. It may arise at any age, and is more common in the male. Pain is the frequent symptom, the pain being greatest in the rectal region, but is also round about too. There are usually rectal symptoms. X-ray may show involvement of the sacrum.

This patient, John Elder, aged sixty-one years, was first seen in the out-patients of Wards five and six, of the Royal Infirmary, Edinburgh, where he had been referred to after treatment for a pain in the back, by Ward two. The patient stated that he had had a dull ache in the bottom of his back for about ten months, and was fairly continuous. For the past seven months his pain had been more marked in his right hip, and had started to radiate down the leg. In the last four months he had had frequency of micturition and also difficulty in initiating the act of micturition. On examination he showed a very hard, and nodular prostate which was larger on the right side than on the left. The patient was thought to have a carcinoma of the prostate, and he was sent for x-ray examination, which was carried out on the 12th. March, 1946, and showed a doubtful area of bone destruction in the region of the left ala of the sacrum. On the 20th. March, 1946, a cystoscopic examination was carried out, and a definite enlargement of the prostate was found including the middle lobe. The bladder neck was also changed and showed nodular encroachment of the lateral lobes on the internal meatus. The bladder walls showed some hypertrophy. X-rays here showed some changes in the right side of the sacrum, which would appear to be an erosion. The conclusion reached was that of carcinoma of the prostate with secondaries in the pelvic bones. The patient was placed on stilboestrol, the dosage being three tablets (0.5mgm) per day. The patient was admitted to Ward six, on the 17th. April, 1946, His blood urea nitrogen was 10 mgm%, by the Van Slyke method. The patient was operated on by Mr. R.L. Stewart, on the 23rd. April, 1946, the operation being a 'Per Urethral Resection of the Prostate'. The patient made very satisfactory progress after his operation. A catheter was passed at the end of the operation and for the first two days he received wash-outs of 1/1000 silver nitrate. The acid serum phosphatase on the 1st. May, 1946, was 1 unit. and x-ray examination showed definite destruction on the left side of the sacrum. The patient was discharged home on the 7th. May, 1946, still on stilboestrol therapy. Further cystoscopic examinations were carried out on the 18th. June, 1946, and on the 22nd. October, 1946, and these showed a perfectly clear passage for urine from the bladder. The prostate had locally regressed, although it was still fixed and indurated on the right side. There was some calcification in a part of a sacral metastases, though erosion was still present. The patient progressed satisfactorily, he had no urinary trouble, though at times he had some pain in the back. He was however very stiff. The prostate gradually decreased in size, and was not so hard. By the 31st. July, 1947, the patient's condition was so good that his stilboestrol was stopped. However by the 19th. November, 1947, he was complaining of pain, and the patient was once again started on stilboestrol. By the 28th. April, 1948, there was an increase in the pelvic metastases. The prostate by this time was very small, and fibrous to the touch. At the beginning of the year the patient was still having pain in his legs, though he was having no urinary trouble, but still required to keep on taking his stilboestrol.

Anatomy of the Prostate.

The prostate is a solid organ, consisting of fibrous tissue, plain muscle, and glandular tissue, while the fibrous condensation on its surface is called its capsule. It lies between the bladder neck above, and the perineal membrane below, and is transversed by the first part of the urethra.

The glandular portion of the prostate arises as a series of solid outgrowths from the epithelium of the urogenital canal during the third month. The outgrowths are simple at first, but become branched, and finally acquire a lumen. They are arranged in three groups - an upper and a lower dorsal, and a ventral group. The glands of the ventral group soon become reduced in number and often completely disappear, those of the upper dorsal group form the chief part of the prostate. The muscular tissue of the prostate is derived from the muscular wall of the urethra.

The prostate is divided into various parts. An apex, base, an anterior surface, a posterior, and two lateral surfaces.

The apex is an inch and a half above the level of the anus, and rests on the fascia that covers the sphincter urethrae.

The base is partly continuous with the neck of the bladder, and is partly separated by a circular groove which lodges veins.

The anterior surface is structurally continuous with the superimposed bladder, neither the fibrous nor the muscular constituents showing any interruption, as they pass from one organ to the other. It is separated from the retropubic space by the pubo-prostatic ligaments, and from the lower part of the symphysis by fibro-fatty tissue, and a plexus of veins.

Posteriorly the prostate is flat and is in contact with the anterior aspect of the rectal ampulla, the recto-vesical fascia intervening. It is pierced on each side of the median plane by the ejaculatory duct.

The lateral surfaces are convex and are more infero-lateral than lateral. They are supported by the levator ani.

The prostate possesses a strong fibrous sheath which is continuous above with the fascial covering of the bladder and in front with the pubo-prostatic ligaments. Posteriorly the sheath is formed by the recto-vesical fascia, and on each side it is little more than the fibro-areolar tissue in which the prostatic plexus of veins is embedded.

The blood supply to the gland is from the inferior vesical, and middle rectal arteries, while the venous drainage is into the internal iliac vein. The nerve supply is from the pelvic sympathetic plexuses. The lymph vessels end in glands on the walls of the pelvis in front of the bladder, and alongside the arteries, mainly into the internal iliac and sacral lymph glands.

Discussion.

Carcinoma of the Prostate is a disease which has become recognised widely, and regarded with great interest. It has become of greater importance in this century due to the fact that people are living longer, and thus more people are entering the cancer age.

It is regarded as the commonest cancer of the genito-urinary tract, and would be commoner still if greater care was taken over pathological examination of specimens.

Cases of this disease usually appear earlier than that of simple prostatic disease, the average age being fifty to sixty years, though it is regarded by some to be more in the sixties and seventies. Cases have however been reported where it has occurred earlier than fifty.

Aetiology.

The cause of this disease is a very difficult one to make out. Like any other cancerous growth in the body, it is possible to put forward suggestions as to the possible aetiology. In regard to carcinoma of the prostate it is possible to come very near, if not actually state a cause that would appear satisfactory.

A large part of the age group affected bears a relationship to that of the group of benign prostatic hypertrophy, and often in the other parts of the gland not affected by the tumour growth this hypertrophy is found. It has been said that twenty per cent of all unoperated benign enlargements of the prostate eventually develop secondary malignant change. This is recognised by the appearance of a hard nodule or nodules in the substance of the gland, or commonly by infiltration, and fixation at its lower end or one or other lateral margin. (Winsbury-White).

Thus we have a possibility of the cancerous growth being a further development of the hypertrophic stage.

It is however regarded by many people as a result of hormonal imbalance. As it is possible to cause enlargement of the female breast by oestrogens, it should be possible to cause enlargement, and change in the prostatic tissue with androgen excess. This could arise from improper function of the anterior pituitary gland, or as some people think due to an abnormal or modified androgen. This is partly supported by the fact that in many cases treatment with oestrogens, the opposite hormone to androgen shows a decrease in size and structure of the tumour. Whether this acts directly upon the prostatic tissue or through the pituitary gland it is difficult to say.

Another point in this hormonal cause is that castration can cause an improvement in the condition. The prostate is dependant on stimuli from the testes for both its development and activity. Castration if done before puberty prevents development, while if done in adult life, it causes regression of the normal gland. Huggins and his associates have worked on this fact for the treatment of the disease.

Perhaps about the fifties or sixties in man there occurs a change in the testes similar in its way to that in woman at the menopause. Here though instead of a dying out of the function, renewed efforts are made by the organs concerned, by creating more of the hormone needed to carry on proper function. This excess hormone however having a normal effect on the testes, but leads to an increase in the growth, i.e. hypertrophy, of the prostatic tissue, which if it is too advanced may become carcinomatous. Just as it is difficult to state the aetiology of the disease generally, it is as difficult to make out any cause in this case.

Pathology.

There are stated to be three types of tumour growth of the prostate which are malignant:-

- | | |
|-----------------------|--------|
| I. Adenocarcinoma. | - 85%. |
| II. Undifferentiated. | - 10%. |
| III. Squamous. | - 5%. |

(Winsbury-White).

Some people are more inclined to divide the adenocarcinoma up and include in it a scirrhous carcinoma, and also state that it is a commoner type. Muir's pathological grading is according to the tendency of the growth to form prostatic tubules. In group one, tubule formation is a prominent feature, mitotic figures being absent. Group three shows the bulk of the tumour to be undifferentiated, and bone metastases, and group two, shows intermediate pathological types.

The microscopic diagnosis is usually easy to differentiate between the types, but occasionally it is very difficult to differentiate between benign hypertrophy and commencing malignancy, and if this should occur, the prostate should be regarded as malignant until proved otherwise.

Usually microscopically the section shows a glandular structure, but sometimes there is less differentiation, and the cells are arranged in irregular masses. The glandular type is the one that reacts best to the hormonal treatment, while the squamous is the worst. Undifferentiated carcinoma is unaffected, when it has no tubular structure present. It is often very difficult to find the area of tumour growth in a prostate, and many sections are needed, due to the cancer being multicentric. On macroscopic examination the chief characteristic is the hardness of the prostate. When cut, its surface is dry, and does not bulge, and in the early stage the malignant disease forms multiple opaque nodules of firm texture, which give the gland its hardness.

The growth usually starts in the posterior and upper parts of the gland, and the right side being commoner than the left, while the middle lobe is said never to show primary malignancy. The growth is usually limited by the fascia of Denonvilliers.

The spread takes place both locally and distant. The growth on many occasions begins in the posterior lobe, as previously stated, and spreads up along the line of the ejaculatory ducts, and appears between the bladder, and the seminal vesicles, invading the base of the bladder, and surrounding structures.

Three other ways can count for distant spread. 1. Normal lymphatics.

2. Perineural lymphatics. 3. Blood stream.

The perineural lymphatics can often be seen distended with cancer cells, and the capsule of the prostate is the first usually affected in this way. By means of these, and normal lymphatics, pelvic, and lumbar lymph nodes are involved early, and it may even spread to thoracic and supraclavicular nodes. The inguinal nodes are affected in about fifteen per cent of cases, probably due to lymphatic connection with the seminal vesicles, urethra, and retrograde transport from these areas. The liver and lungs may be affected by the blood stream. Very important secondaries in regard to this disease are those of bone. The commonest sites are the pelvic bones, sacrum, and lower vertebrae, thought to be affected by carriage of the growth by the perineural lymphatics.

(Winsbury-White), though Batson has pointed out that a more frequent route is probably the vertebral system of veins. The femurs, ribs, and skull may also be affected. In many instances the disseminated cancer cells excite a remarkable osteoplastic reaction, which results in both increase in density, and girth of the affected bone. The medullary canal is often obliterated, and a severe degree of secondary anaemia may result from destruction of the bone marrow. Occasionally osteoporosis may occur simultaneously. Not infrequently, obstruction of one or both ureters occurs due to the growth, in addition to the obstruction of the urethra.

It is important thus to get an idea of the type of growth, and its malignancy as an aid to treatment. Baines(1942) considers 'it is probable that the survival period in a patient can be more accurately prognosticated from the degree of malignancy discovered than any other source of information'.

Thus there are several advantages to pathological grouping.

1. It provides in groups one and three (Muir), an approximate survival period for each case. A knowledge of this gives advice as to whether oestrogen therapy would be of use.
2. Therapeutic requirements should be affected by a knowledge of pathological grading. Thus group three would require the maximum treatment.
3. Results of operation can also be based upon this grading.

From the microscopic report on the specimen of prostatic tissue sent to the pathological department, we find that our patient had a poorly differentiated scirrhous carcinoma. This type of tumour comes into the main group of prostatic tumours as shown by Winsbury-White.

The fitting of the tumour into Muir's pathological grading is rather upset by the use of the stilboestrol therapy. Being poorly differentiated it would fit into group two, but it would appear that this differentiating is not very marked, and it must be very close to grade three. By just going on the presence or absence of mitotic figures, we come under group one, due to the absence of mitotic figures. However we must remember that the patient was on therapy for some time, and this would affect these mitotic figures. Ferguson and Pagel found this was in effect, and thus we can still place the tumour in late group two.

We do not know in what part of the prostate the tumour growth started, but it may be assumed that a large part was on the in the posterior lobe, though other parts when examined per rectum suggested advanced spread throughout the prostate gland itself. The right side of the gland was larger than the left, which is a common occurrence.

The patient showed definite signs of secondaries in the bones, and none elsewhere. These were restricted to the sacrum, the sacro-iliac joints, and the iliac bones. It would appear more likely that these were affected by the vertebral system of veins. From the presence of these secondaries we must assume that the tumour had been present for some considerable time, probably about a year. Thus from the pathological point of view, the prognosis would appear to be very bad due to the advanced type of lesion.

Features.

The patient as already stated may vary in age from fifty to seventy years of age. As with his age, also may his appearance. When he first notices signs of prostatic trouble he may be still a very fit man, and may appear for treatment then. However the symptoms may be so trivial that he does not notice them, and his general health becomes very impaired before he comes for treatment. On the other hand many cases are treated as other diseases, e.g. gastric, sciatic, etc., before the real cause is found, and here again the patient's health may be poor. Thus there is no definite appearance about the patient.

The patient fits into the age group of the prostatic type, as he is sixty-one years of age. When his symptoms did begin, they were not recognised, and he received physiotherapy for a sore back. The idea of carcinoma of the prostate did not appear to enter into the case at that time.

A person's symptoms are very variable, and on many occasions are very few, and occur rather late in the disease.

The first symptom is often frequency of micturition occurring both day and night, though to the patient more marked at night, usually being disturbed at first in the early hours of the morning.

Frequency can be due to three causes. The tumour causing enlargement of the prostate may tend to block the passage of urine from the urethra. To overcome this the bladder musculature hypertrophies, but sooner or later this is followed by dilatation, and a residual urine of variable quantity occurs, and causes a diminishing bladder capacity. Some cases show no residual urine, or if so very little, and not enough to account for frequency, and here the cause is probably the enlarged gland interfering with the mechanism of the internal sphincter, and urine thus being constantly present in the posterior urethra, or the trigone may be elevated as a result of the increasing size of the prostate, and thereby under constant stimulation to initiate the act. Frequency may also be caused by a coincident cystitis resulting from an urinary infection.

Difficulty in the act of micturition may be the first symptom or even follow upon frequency. It is very variable. Often delay in starting the act, especially if the urine has not been passed for a while. Thus acute retention occurs sometimes. The patient may state that if he drinks a lot, or if he goes out in the cold, he has difficulty in passing water, and tends to retention. The stream loses its force, becomes slower, and tends to dribble towards the end, and may be intermittent.

Pain in the abdomen may be due to a cystitis. Haematuria is sometimes complained of, and is associated with a soft congested part of the gland.

The patient who has very few symptoms to offer may yet show a marked degree of chronic retention. This may have been very gradual due to the slow growth of the tumour. No alteration in the bladder function is complained of, though on direct questioning, small points may be picked up, such as a diminution in the strength of the stream. He may be thirsty, constipated, and have a poor appetite, loss of weight, while the skin is very dry. These are uraemic manifestations due to back-pressure, effects of long standing from the distended bladder. These effects would occur in a prostate with a very slow growing tumour.

The above symptoms are similar to those of simple prostatic hypertrophy. However besides these symptoms, you may get those of metastases in various parts of the body. The commonest being pain in the back, and perineum, and sciatica, especially when bilateral.

In a survey, carried out by the British Empire Cancer Campaign, they found that fifty-three per cent of patients consulted their doctor within the first three months of their symptoms, and that the number in whom the disease was over six months standing when first seen was as high as twenty-five per cent. (Lancet. July, 1948).

The symptoms shown by the patient in the case were as is usual in a case of carcinoma of the prostate very variable. Here we had the pain from the secondaries first, which were just like ordinary back-ache, and the pains down the legs were like sciatica. It was only on questioning that it was found that he had developed lately some frequency of micturition, and also a difficulty in initiating the act. The patient did not show any symptoms of secondary effects to this frequency and difficulty, though here we have a point in favour in that his history in regard to this was short.

Examination of the patient is now carried out. First a general examination of the abdomen is done. A distended bladder may be observed, and usually nothing else. The next part and the most important part is the rectal examination. This may be done with the patient in one of three positions. Left lateral, the patient on his back, and his knees flexed, or Picker's position.

In the early stages the prostate feels normal in size, but one lobe is considerably harder than the other, and the impression gained is that there is a hard central nodule covered by a layer of softer tissue. (Swift Joly). Somewhat later the vertical median furrow between the lateral lobes becomes obliterated. Later still, the whole gland is indurated and its mobility is impaired. If the sulcus between the vesicle and the prostate is filled up, it is suggestive that the periprostatic lymphatics are involved.

The examination of the rectum should be repeated often. The enormous irregular nodular adenocarcinoma, and the small stony hard fixed scirrhus are usually obvious.

The rest of the body, and other systems are now examined to exclude the possibility of the presence of secondaries from the primary in the prostate, especially in the bones.

In the examination of the patient, John Elder, nothing is reported as being found except the prostate being enlarged, and very hard, and nodular, with the enlargement more marked on the right side than on the left. This is a typical picture of a prostate containing carcinomatous tissue.

There is however no report on the case in regard to the examination of the patient's movements at the pelvi-sacral joints, etc. We are thus unable to make any definite comment on this fact, though I am sure with the history of pain in the back of the legs passing down the legs, is suggestive of involvement of the sciatic nerve, he would show a decrease of movement in his legs. An allowance would have to perhaps be made for a decrease in movement often associated with a person on an age such as this patient.

Special examinations are now carried out. These are:-

- I. Blood examination.
2. Examination of the urine.
3. Radiography.

4. Blood urea.
5. Acid serum phosphatase.
6. Alkaline serum phosphatase.
7. Cystoscopy.
8. Intravenous urography.

Blood examination consists of a complete blood count, a white blood count, and haemoglobin estimation. This rules out any dyscrasias, and also if there is any secondary anaemia, which might be present if bone metastases had affected the bone-marrow. This also gives a guide as to the patient's condition for operation. The blood group is also done lest transfusion be required later. Examination of the urine includes the normal routine examination, i.e. specific gravity, colour, reaction, sugar, albumin, acetone, and blood. A specimen is also sent for bacteriological examination.

Radiography is done specially of the pelvis, and lower lumbar vertebrae, and also the other parts of the body skeleton and body in which the patient complains of pain or abnormal sensation. This will show, if present, secondary deposits. The blood urea has been done by many people quite automatically on all patients, but it has now become partially recognised by some people, both in surgery, and among biochemists, as being useless unless the patient is in the last stages of disease. The normal blood urea is from twenty to forty mg per one hundred ccs. but may be raised to fifty mg per one hundred cc in elderly men. Provided the clinical findings are satisfactory a rise to fifty-five mg per one hundred cc will not contra-indicate a major operation upon the prostate, but anything above this must be regarded as a sign of serious impairment of the kidney function.

Acid serum phosphatase and Alkaline serum phosphatase should be taken together. A direct relationship between carcinoma of the prostate and male gonadal activity is revealed by studies on the enzyme phosphatase.

Phosphatase is found in abundance in growing bone and cartilage. There are two varieties of the enzyme, alkaline phosphatase, with an activity maximum at pH 9, and an acid phosphatase with an activity maximum at pH 5. The alkaline phosphatase is present in growing bone, and is apparently produced by osteonlasts. The acid phosphatase was originally found in the spleen and kidney of swine, and cattle, but far the greatest concentration is in the prostate, where it is apparently produced by the prostatic epithelium. The enzyme can be demonstrated microscopically in the epithelium or both normal and malignant gland by Gomori's method. The Gutmans in 1938 were the first to observe that there was an increase in the acid serum phosphatase in carcinoma of the prostate. The alkaline serum phosphatase is also raised. The acid is however greatly in excess, and though the alkaline serum phosphatase may be up if there are secondary deposits present in bone. There are various methods of estimating the results. The one used most is King and Armstrong's method.

The upper limit of normal in this country is usually accepted as 2.5 King-Armstrong units per 100ml. (British Medical Journal, 1946). Huggins regards it as four units, and ten or more are diagnostic of carcinoma with secondaries. Wray has his own interpretation in King-Armstrong units.

0 - 3.5 units	Normal.
3.5 - 5.0 units	Significant only if there is clinical evidence of prostatic cancer.
5.0 - 10 units	Strongly positive of prostatic cancer.
Over 10 units	Diagnostic of prostatic cancer.

Other diseases occasionally cause a rise to ten units, and these are jaundice, hyperparathyroidism, osteitis deformans, and secondary deposits in bone from primary foci other than the prostate. The highest false positive is found in Paget's disease, but alkaline serum phosphatase is higher than in prostatic cancer, and is a point of differentiation. Huggins shows that the test must not be done when the patient has fever as the acid serum phosphatase falls during any fever, and would ruin the result.

The acid serum phosphatase is also a guide to stilboestrol therapy, as it stays down as long as satisfactory treatment is carried out. In those patients who present equivocal symptoms of prostatic new growth, but where acid serum phosphatase is not significantly raised, it is possible to carry out Wray's testosterone stimulation diagnostic test.

Testosterone propionate is injected daily for fifteen days, in twenty-five mg doses, and the patient's acid serum phosphatase is determined on alternate days. A significant rise in the acid serum phosphatase is diagnostic.

The passage of a cystoscope is regarded by many people as being unnecessary, and of little value in the early stages. (Winsbury-White).

Intravenous urography is recommended, (Lancet, 1949), as an excellent renal function test. It also reveals any effects of back-pressure in the upper tract (dilated ureter or renal pelvis), vesical diverticula may be outlined, and the approximate residual urine assessed.

In the special examinations carried out on the patient various findings were obtained.

As there are no reports on the blood examination we are unable to make any statement on it, and must assume that they were carried out. Urine examination showed no evidence of any abnormality, and from the specimen sent to the bacteriologist, taken at the cystoscopic examination, we find that there are no organisms, a very important point when it comes to the operation, as it helps to make it the less dangerous.

It is with the use of straight x-rays that we are able to very nearly make a positive statement that the pain, etc, suffered by the patient was associated with changes in the sacrum and pelvis.

The straight x-rays taken before the operation gave the information of the changes in the sacrum, though it was only later that they were definitely stated to be from a carcinoma of the prostate.

As mentioned in the discussion already, the acid serum, and alkaline serum phosphatase is a reliable guide to the diagnosis of carcinoma of the prostate, if the patient is showing signs of such a disease. Here however we find that the patient had a well developed carcinoma and yet it was not a high result, only being on the 1st. May, 1946, one unit, by the King's method. However against this point we must remember that the patient was already on stilboestrol, and stilboestrol tends to lower it, but not surely to this extent, suggesting that it was never very high because of the short time the patient was on stilboestrol.

The blood urea in this case was only 10 mgm% by the Van Slyke. This is quite a normal figure, and suggests that the patient did not suffer from back-pressure on his kidneys, but it is regarded usually that if the patient is raised the patient is in a very advanced state.

Cystoscopic examination was carried out on this patient both before and after the operation. Though as already mentioned in the early part of the discussion that cystoscopic examination is a waste of time, surely here we have a case where a great deal of information was obtained pre-operatively. Here we find that there is early trabeculation of the bladder which would suggest that the bladder was beginning to change its structure to overcome the obstruction caused by the prostate. Also we find that the appearance at bladder neck is suggestive of tumour spread. We note that the lateral lobes are enlarged, more marked on the right side than on the left side, a fact which supports the findings found on rectal examination with the use of the finger. However with this type of examination we find that the middle lobe is also enlarged, a fact not made out on rectal examination. This enlargement would play a large part in the causation of his frequency of micturition.

Thus we have found out certain facts which would prove of importance in the type of operation used for this case.

Though intravenous urography is recommended it was not done in this case. It would appear however to be unnecessary if a cystoscopic examination is carried out.

Having taken a history from the patient, and examined him, we have reached a diagnosis and must come to the treatment of the case. Here we come up against three ways, the first being surgical, the second being hormonal, while the third is a combination of both.

Treatment.

In the treatment of Carcinoma of the Prostate by Surgery, many different types of operation have been produced.

The prostate can be reached in four ways, namely, intra-vesical, extra-vesical, perineal, and per urethra.

The intra-vesical route is usually done by Freyer's method. Here the bladder is distended with fluid, and then cut down upon by means of a suprapubic incision, and then opened into, and the prostate palpated. One finger of the other hand is placed in the rectum, and pushes on the prostate, i.e. from below. The finger in the bladder is passed onto the prostatic urethra, and the mucosa torn, or cut through, together with the underlying tumour capsule. The finger is now worked round the prostate, and it is enucleated, if possible and if not an instrument is used. A large drainage is inserted into the bladder, and the bladder, peritoneum, muscles, and skin closed around it. This method has had various modifications to it.

The extra-vesical method is shown by Millin's technique. Here the prostate is approached between the symphysis pubis, and the bladder, and the prostate is shelled out. A catheter is tied into the bladder, and the prostatic cavity sutured around it.

The perineal approach is a very difficult one to do. By means of a transverse incision in front of the anus, the prostate is come upon. It is separated from the rectum, and the urethra is then opened, and the prostate pulled into the wound. The lower exposed end of the urethra is cut and the prostate enucleated, and the urethral ends sutured together, and the wound closed.

Young's original method was to let the urethra granulate around a catheter.

The per urethral approach may be done by two methods. The first is by means of a punch such as Young's punch. The second is by means of diathermy cautery. Here again the bladder is opened, and the punch used per urethra, and the prostate removed partially though some people claim that the prostate can be wholly removed by this method. The second method may be done without opening the bladder, and also under observation, with a continuous irrigation with sterile fluid of the part. The punch prostatectomy is however often done without the bladder being opened, but there is a greater feeling of security if the bladder is opened.

Here we have four ways of approaching a prostate.

In carcinoma of the prostate Wilson H. Hey (Winsbury-White) states that the suprapubic route is used in England, while the perineal and transurethral route in America. He himself uses a transvesical aseptic prostatectomy combined with trigonectomy, vesiculectomy, and if necessary a partial cystectomy, as a radical operation, which he believes to be the best way of treatment, i.e. very radical. To his mind the retro-pubic route is inadequate to deal with the possible or definite malignancy, while the transurethral is the least radical.

The suprapubic operation appears to be regarded as an operation suitable in the growth is in its very early stages, i.e. really in the cases of prostatic carcinoma when it is unknown, and removed as a doubt as to whether it is malignant or not,

If the tumour is advanced it will have spread outside the capsule, and it is here that this operation is not satisfactory. The retropubic route as stated by Hey is regarded by being inadequate. However Terence Millin states that in cases where there is a change, that the tumour is got early enough to warrant a radical, he prefers a retropubic to a perineal approach. A more extensive operation can be carried out. No limit is set to the amount of bladder base which can be sacrificed, and the ureters can be implanted higher in the bladder or transplanted into the colon. (Lancet, March, 1949). Here he believes in the same idea as Hey that as much as can be removed should be done, though he uses a different approach to the prostate.

The perineal route is regarded as being suitable for a radical removal of the prostate, but there is a high mortality against its use. However in certain discussions in the medical papers lately, the main line of discussion has been the punch prostatectomy.

The transurethral route with the use of the punch appears to be the most favourite operation. It is perhaps the easiest, and safest, and carries a lower mortality rate. It does not however remove a great deal of tissue, but as it is usually in the posterior lobe that the tumour begins, it would appear satisfactory. It is usually always now combined with stilboestrol therapy.

With these four operations it would appear that though the radical operation is favoured in suitable cases, where the tumour is not too far advanced the punch-prostatectomy, and stilboestrol is regarded as the best. Here you avoid the risk of the mortality rate due to the big risk operation. If there are secondaries present it would appear to be best to have a punch prostatectomy, and stilboestrol, rather than a radical as the radical operation will not remove the secondaries, and you can at least keep them under reasonable control as also the primary with stilboestrol.

The patient received a punch-prostatectomy by means of a Young's punch. Here the urethra had to be dilated with bougies before the punch could be used satisfactorily. We must remember that there was difficulty in passing the cystoscope at the first examination.

The bladder was opened in this operation, though this does not appear to be the usual way, because when the bladder is opened, the dangers of the operation increases especially in regards to infection, even though it is closed at the end of the operation. The bladder was drained by the passage of a catheter per urethra, which was left in and washed out with Silver Nitrate, which helps to control haemorrhage from the area. The catheter also helps to keep a clear urethral passage.

In this case it would appear that the main cause of his urinary trouble depended upon this marked enlargement of the middle lobe, though he had lateral lobe enlargement and spread to the surrounding tissues.

Thus in order to remove the primary situation of the tumour, we have to do a fairly radical operation. This operation would be more of the type adopted by W. Hey. However we must remember that the patient had secondaries present which were fairly far advanced. Thus would it be fair to submit a man to such an operation, with these present, which would have to be treated by castration or oestrogen therapy.

The Vas Deferens is sometimes ligated on both sides to prevent the passage of infection along them, but this was not done in this case.

Thus after the operation it was hoped that the carcinomatous tissue left would be treated by stilboestrol therapy satisfactorily.

The treatment of carcinoma of the prostate by oestrogen therapy is a relative new method of treatment, i.e. compared with surgical methods.

In the use of oestrogens we come up against the aetiology of the disease itself.

As previously stated it is an unsolved problem, though many facts point to the suggestion that oestrogens, androgens, and the pituitary play a part.

Huggins and his colleagues found that the secretion of the prostatic fluids in dogs was stimulated by androgens. These androgens gave a hyperplasia and a metaplasia which returned to normal with oestrogens. (Aird). However

Zuckerman and Parkes have also shown that injections of oestrin into monkeys caused prostatic hypertrophy, fibrous muscular overgrowth of the whole prostate together with epithelial stratification and distension of the uterine musculature. These effects were counteracted by injection of male hormone.

Thus we have two different ideas on the same subject. In connection with these latter effects Moore and his associates have observed that prostatic tissue of the rabbit transplanted into the anterior chamber of the eye showed a greater growth to oestrin than to male hormone administration.

Herbst has applied the work of Huggin's to man and first suggested that a physiological castration could be affected by oestrogen inhibition, of the gonadotrophic function of the pituitary. The theory is that the oestrogens inhibit secretion of the anterior pituitary gonadotrophin thus decreasing the secretion of testosterone by the interstitial cells of the testes, and this disturbs the metabolism of normal prostatic tissue, but also of the malignant tissue. (Aird). This would appear to be the best reason for

oestrogen action, because it is known that the interstitial cells do secrete a hormone which control the prostate. It was thought at one time that a specific pituitary inhibiting hormone was elaborated by the germinal epithelium, but work done by Nelson and Gallagher rather disproves this suggestion completely. However Herbst's idea that the pituitary has to decrease this testicular secretion, rather suggests that there is an increase in its secretion, which appears unlikely in old age, but may occur to keep the prostate gland going.

The whole subject of treatment by stilboestrol is still a difficult one to explain.

It is known however that it does have a marked effect in certain cases, which would appear to depend upon the type of tumour as already mentioned earlier on in this discussion.

A great deal of work has been done in regard to the use of stilboestrol and its result in the actual prostatic tissue. Schenken, Burns, and Kahle recorded histological comparisons of material removed from malignant prostates by repeated transurethral resection during the first two months of treatment. Fergusson Pagel did likewise in a series of five cases, four being treated with stilboestrol, and one by dienoestrol, the biopsies being done by use of a Geishon-Thompson cold punch transurethrally. (British Medical Journal 1946). They found from their repeated biopsies that there was a progressive reduction in the number and usually also in the size of the tumour units per square millimetre. Pyknosis and a concentration of nuclear chromatin were present as was a reduction in nuclear diameter. In none of their cases did the carcinoma disappear from the samples of tissue removed.

Stilboestrol causes a tendency to atrophy of the major part of the prostate (that which is not a feminine vestigial remnant), the seminal vesicles, and Cowper's gland, and a corresponding tendency to hypertrophy of those parts of the prostate which are feminine vestiges (the urethral crest and the prostatic utricle) and the breast.

The stilboestrol is given by mouth usually and the dosage is about five mgm tablets. Herger in 1945 got very poor results from this treatment, but this may have been due to insufficient quantities. The dosage is a difficult factor to agree upon. Morsan suggests three mgm at four hourly intervals, till the patient is symptomless, and then a reduced daily dose is given.

Riches says fifteen to twenty mgm daily. It would appear that there is no real fixed dosage for the drug, the amount depending upon the case itself, thus the optimum varies, but is usually about twenty to thirty mgm daily, and a maintenance dose obtained as soon as possible. Repeated checks on the acid serum phosphatase are regarded as a satisfactory guide to the treatment. W.H. Hey advocates the use of Thyroid extract one and a half grains to five grains per day as it appears to allow a smaller dosage of stilboestrol to be used.

Stilboestrol has however caused other effects on the patient. These are:-

- I. Cardiac symptoms and vertigo.
- II. Painful swelling of both breasts, with pigmentation of the areolar, and weeping from the nipples.
- III. Oedema of the ankles.
- IV. Hot Flushes.

Another drug called dinoestrol is now used by some people. It appears to be better tolerated and more potent, and you can also give smaller doses. (British Medical Journal, Sept. 1946).

With these drugs in a satisfactory case, the prostate becomes smaller, and softens, and the impairment to the urinary flow lessens, and the pain due to the growth is eased. Secondary growths throughout the body, mainly the bone metastases, and the results of these, e.g. pain in the spine, root pains, disappear. Radiographic evidence also shows proof of arrest of growth of the deposits and in some cases actual recession. Stilboestrol also brings back a normal blood picture, which does not clear up in other ways. In the majority of cases where it is used before operation and carried on afterwards, the results appear good. However in certain cases where the tumour is so advanced, it may be used by itself.

The treatment by castration has been carried out for many years. It produces marked atrophy with degeneration in the glandular cells by stopping the supply of the testicular androgens. It is thought however that the adrenal cortex continues to secrete androgens, or secretes them in greater quantities than previously, and that relapses that occur at times may be due to this. (British Medical Journal, 1948).

H.J.Cox did the operation of adrenalectomy on three cases. His results showed that as a practical measure the result was a failure, but the prostatic carcinoma did show a sensitivity to ketosteroids of adrenal origin. (Lancet Sept. 1947). Huggins and others reported that fifty per cent of their cases showed improvement in their health after castration.

The operation carried out is that of sub-capsular orchidectomy. It is done through a one inch incision at the bottom of the scrotum protruding each testis in turn, and through an incision in the tunica albuginea the contents can be easily cleared. (Hey. Winsbury-White).

Irradiation has been tried in the past but seems to have failed due to its danger to the surrounding tissues.

If oestrogens fail to relieve bone and joint pains, a course of deep x-ray therapy may do so, and it is in fact more likely to do so. (British Medical Journal, 1946).

The patient was put on stilboestrol therapy. As to the exact time of the beginning of this therapy I am unable to make any definite answer. He was either put on it when the condition was first recognised or when he was admitted to the ward for operation, though it would appear more likely to be when he was first diagnosed. The dosage at this time was three tablets daily, the tablets being five mgm each.

The first time we find an accurate report on the patient's progress, which gives us the value of the stilboestrol in this case is on the 10th. June, 1946, when the patient received a cystoscopic examination. Here we find that the patient's condition is very satisfactory, though there is still some pain in the back. A point worthy of note is that he has no more urinary trouble which shows that the operation was successful in removing the obstruction to the urinary flow.

Already there was changes in the prostatic tissue. The left lobe was soft, and contracting while the right side was not quite so hard. This shows some regression, and can only be attributed to the stilboestrol. The cystoscope was now able to passed easily, which also showed that the past obstruction was removed. The prostatic tissue around the neck though still prominent has lost its irregularity.

Already in the three months from the last x-ray, which showed the bone changes to have advanced very quickly, but now after stilboestrol therapy there is no evidence of further destruction, but there might even be regresion of the lesion in the sacrum with new bone formation.

We now pass on for four months when again we have reports on a cystoscopic examination. The dosage of the stilboestrol had been reduced to two five mgm tablets daily, which appeared to be his satisfactory maintenance dose. Here the patient showed marked improvement, though he was still occasionally getting slight pains in her back yet.

The prostate is now smaller, but there is still no real change in the right lobe of the prostate.

During 1947 the patient did very well on the stilboestrol. He did so well that he tried one month without stilboestrol but he developed pains in the lumbar region again, and it was found necessary to start it again. The x-ray examination showed that the deposits were those of a carcinoma of the prostate, and the features did not appear to change at all, or if so very slightly throughout theyear. The prostate was becoming smaller and also softer to the touch. His testes were small due to the stilboestrol.

At the beginning of 1948 the prostate was hard and nodular in the right lobe, which would appear to be an re-occurrence of the troubles as this was not mentioned before, the reports previously saying that it was becoming soft. The x-ray report showed an increase in the areas of involvement of the sacrum.

During 1948 the patient appeared to have a very good spell, and the stilboestrol was reduced to one a day. However the pain in his back returned and it was necessary to return to two a day again. Thus it would appear that his maintenance was definitely two a day. After this return to the two tablets a day, he felt better, though at his last report, his pain had returned to his legs.

Thus it would appear that the patient had times when he was very good regardless as to what dosage he was taking, but if he was clear, and the dose was reduced he got his pains back.

With the pain appearing in his last report, which passed down the legs, it would suggest that the bone lesions were again advancing, and that it might be necessary to increase the dosage to a higher one.

Conclusion.

We may perhaps make certain conclusions on this case of Carcinoma of the Prostate. The patient's short history of urinary complaint must suggest that growth can take place to such an extent in the prostate, and yet not affect micturition. Thus the patient was treated by physiotherapy for a solid three to four months by it because of it. It would appear right to examine all cases of disease in men above forty, the prostate by rectal examination.

From the examination of the prostate one fact appears to stand out. This fact is that the acid serum phosphatase was never raised above three units, yet the case was far advanced with secondary deposits in the bones. Yet against we must allow perhaps for the freshness of the specimen by the time it passes from the ward to the place for examination.

With such a widespread lesion it would appear more appropriate to do a radical operation. However here only a transurethral punch prostatectomy was done, which is regarded as only removing a little bit of the prostate, and best used if the patient is in a bad way, to relieve the difficulties in micturition. This patient was in a reasonable condition, and yet combined with stilboestrol therapy, it has so far had excellent results. It would thus appear, that would it not be better to do this type of operation with a lesser mortality rate, and allowing people to live at least for several years, than submit them to an operation where they might not recover. With the effect upon the secondaries by the stilboestrol, it is interesting to know if they are in anyway dependant for thriving upon the primary tumour, and would be affected by stilboestrol acting upon the primary. Finally it is seen that it is necessary to keep the stilboestrol going as when it is stopped, his symptoms of pain the back recurred. Therefore it is necessary to keep a close watch on the patient, and if needed to increase the dosage till its peak is reached.

Mr. Robert Bell.

Age.

Occupation.

Class.

Address.

Ref.

Date.

Date.

CASE. NO. II.

Ref.

Ref.

Present.

The patient states that he suffered an acute onset of upper abdominal pain at 11:00 a.m. this morning while at rest. This pain is of a burning nature. It has become generalized over all the upper abdomen. He does not complain of nausea or vomiting. He has had no trouble with his bowels or his urine.

For the past week he has had a fairly severe pain which is of a burning nature.

A CASE OF CHRONIC DUODENAL ULCER.

The burning nature and

ITS COURSE AND TREATMENT.

On the 15th. July, 1917, he was admitted to Ward 13, of the Royal Infirmary, Edinburgh, because of a perforated ulcer. This was missed, and he was discharged home 14th, and on 15th.

Ref.

Food and Habits.

He was on diet after discharge from Ward 13, but found it difficult to keep to.

Ref.

His wife died recently, and he has to manage the house himself now.

Case No. 2.

Name. Robert Putt.

Age. 36years.

Occupation. Clerk.

Address. 227, Annandale Street, Edinburgh.

Doctor. Dr. Hume Cuthbert.

Admitted. 9th. December, 1947. Discharged. 23rd. January, 1948.

Complaint. Abdominal Pain.

History.

Present.

The patient states that he suffered an acute onset of upper abdominal pain at six o'clock this evening, while at rest. This pain is of a stabbing nature. It has become generalised over all the upper abdomen. He does not complain of nausea or vomiting. He has had no trouble with his bowels or his urine.

For the past week he has had a fairly severe pain which started suddenly, and which is more or less continuous. This pain, he thinks is mainly of a stabbing nature, and situated in the upper abdomen.

Past. On the 11th. July, 1947, he was admitted to Ward I3, of the Royal Infirmary, Edinburgh, because of a perforated ulcer. This was closed, and he was discharged home fit, and on diet.

Social Conditions.

Food and Habits.

He was on diet after discharge from Ward I3, but found it difficult to keep to.

Family.

His wife died recently, and he has to manage the house himself now.

State on Examination.

Intelligence. Good.
Development. Very Good.
Muscularity. Good.
Nutrition. Good.

General Appearances.

He was a well developed man, who looked his age.
He looked in obvious pain.

Temperature.

This was 98degrees F. on admission.

Pulse.

This was 88 per minute on admission.

Respiratory Rate.

This was 24 per minute on admission.

Blood Pressure.

This has not been recorded.

EXAMINATION OF SYSTEMS.

Alimentary System.

Appetite. His appetite for the past few days has been poor.

Thirst. He is very thirsty now, but has not been so lately.

Dysphagia. He has no difficulty in swallowing.

Pain. He complained of this sudden abdominal pain of a stabbing nature, which was generalised over the abdomen. He has also had pain for the past week, which has been more less continuously.

Feeling of Weight.

He has never had any feeling of weight.

Distension.

He states that he is troubled with a feeling of distension at times.

Flatulence.

He has been troubled with flatulence to a fair degree in the past.

Heartburn, Waterbrash, and Nausea.

He is rarely troubled with these, and they are not very severe.

Vomiting. He has had no vomiting.

Action of Bowels.

These are quite regular, and that he has no trouble with them.

Lips. They are reddish in colour, and are dry.

Tongue. It is reddish in colour, and rough. It is dry, and slightly furred. No tremor present.

Teeth. False.

Abdomen. General.

The abdomen is held tight. It moves little on respiration. Movement appears equal, but diminished on both sides. An old right upper paramedian scar is observed.

Palpation.

The whole abdomen shows marked rigidity. Perhaps more marked in the upper part of the abdomen than in the lower.

Tenderness can be elicited all over the abdomen, and is maximal in the right hypochondrium.

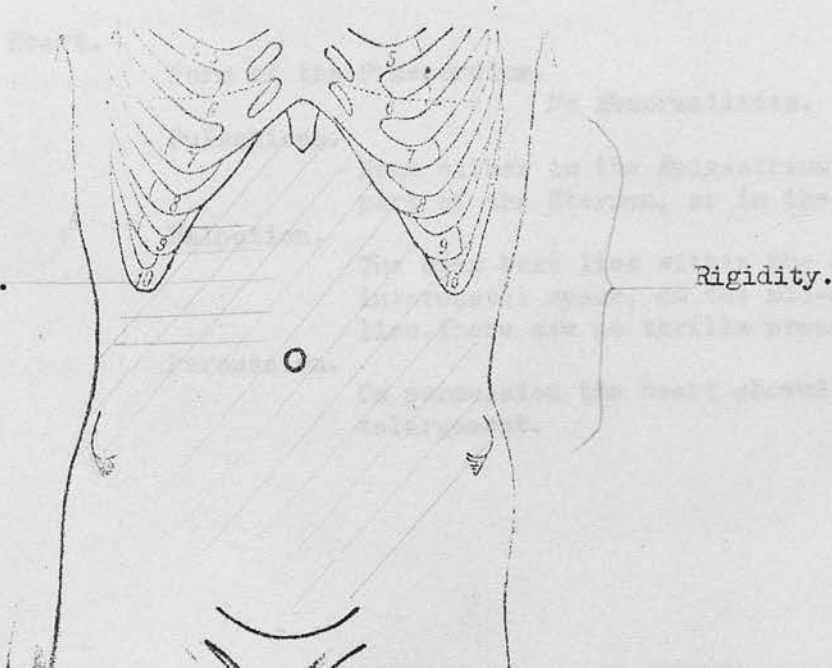
Rebound tenderness present. There is no diminution of liver dullness.

Percussion.

Dullness was observed in all parts.

Rectal Examination.

Nothing observed.



Circulatory System.

Dyspnoea. He has no breathlessness at all.

Palpitations.

None.

Pain. No pain in the praecordial region.

Faintness.

Never felt faint.

Arteries.

Pulse.

On admission it was 88 per minute. After operation it rose 100 per minute, but fell to an average of 70 per minute.

Rhythm. Steady.

Force. Medium.

Systolic. Average.

Diastolic. Average.

Nature of the vessel wall. Not palpable.

Nature of the Pulse Wave. Regular.

Blood Pressure.

Not recorded before operation.

After the operation it was noted by use of the Sphygmomanometer: _

Systolic Pressure. 165mms. Hg.

Diastolic Pressure. 100mms. Hg.

Veins. No abnormality.

Capillaries.

There is no cyanosis, or dropsy.

Heart.

Form of the Praecordium.

No Abnormalities.

Pulsations.

None either in the Epigastrium, upper part of the Sternum, or in the Neck.

Palpation.

The apex beat lies within the 5th. intercostal space, on the mid-clavicular line. There are no thrills present.

Percussion.

On percussion the heart showed no enlargement.

Auscultation.

Mitral.	All heart sounds are
Tricuspid.	easily heard, and are
Aortic.	quite normal. There are
Pulmonary.	no murmurs present.

Rate of the Heart.

Fast.

Rhythm.

Regular.

The Pulse is present.

Respiratory System.

Cough. No cough.

Expectoration. None present.

Haemoptysis. None.

Breathlessness. Only after onset of the abdominal pain.

Pain None.

Signs.

Breathing.

Rate. This is on the average 24 per minute.

Type. Mainly the Thorax alone at present.

Rhythm. Regular.

Sputum. None.

Thorax.

Inspection.

The chest is fairly well covered. Square in shape. There are no local or general departures from the normal.

Palpation.

Movements are equal, and of a very good expansion. Vocal Fremitus is on both sides.

Percussion.

Equal, and resonant in all areas, and on both sides

Auscultation.

Breathsounds. Normal.

Accompaniments. None.

Vocal Resonance. Equal on both sides.

Urinary System.

There is no pain in any part.

Micturition.

No frequency or pain.

Kidneys.

Not palpable. Abdomen too rigid for palpation.

Urine.

Nothing abnormal discovered.

Nervous System.

Mental Function.

There are no abnormalities.

Cranial Nerves.

No abnormality.

Reflexes.

Superficial. Present.

Abdominal. Present.

Plantar. Present. Flexor.

Deep.

Knee Reflex. Present on both sides, and equal.

Ankle Reflex. Present on both sides, and equal.

Haemopoietic System.

The glands in the groin are slightly enlarged.

Spleen.

It could not be palpated.

No blood or bacteriological tests done.

Endocrine System.

Pancreas. Nothing abnormal discovered. Urine_Sugar free.

Thyroid. It is of average size, and consistence. There are no pulsations. No symptoms of an abnormal Thyroid.

Parathyroid. There is no Tetany present,, and no signs of changes in the bones.
Suprarenals. There is no pigmentation of the skin, and no symptoms or signs connected to the Suprarenals.
Pituitary. There are no skeletal changes,, and no changes in sex character.
Gonads. There are no abnormalities.

Integumentary System.

Nothing abnormal discovered.

Locomotorory System.

Bones.
Joints. Nothing abnormal discovered.
Muscles.

Reproductive System.

No abnormality.

From the history, and the examination of the patient,, a tentative diagnosis of Perforation of an Ulcer was made and operation was decided upon.

Non-operative treatment.

Penicillin, 50,000 units, three hourly was started.

Operation.

Premedication.

Omnopon. gr. I/5.

Atropine. gr. I/1000.

By subcutaneous injection at 11p.m.

Operation.

9th. December, 1927..

Surgeon. Mr. Ross.

Anæsthetic. Pentothal, Gas,
Oxygen, Ether.

Nature of the Operation. "Closure of a Perforated Duodenal
Ulcer"..

The abdomen was opened through an upper right para-
median incision, medial to the old scar. Thick fluid was
encountered, and old adhesions were broken down.
A perforation about one cubic centimetre in diameter was found
on the upper surface of the first part of the duodenum,
immediately adjacent to the pylorus, the whole region being indurated.
The perforation was closed with several sutures, and covered
with omentum, and the wound closed in layers without drainage..

Post-Operative Treatment.

The penicillin was continued. The patient was put on gastric suction, and given an intravenous drip of saline and glucose.

The patient's progress was noted on the following days.

11th. December, 1947.

The patient was taken off the drip, and suction. He states that he is feeling very well.

16th. December, 1947.

His progress was very satisfactory.

23rd. December, 1947.

He was seen by the Dietetic Dept. of the Royal Infirmary, Edinburgh, and given a suitable diet. He was discharged on this day to Beechmount Convalescent Home.

Reports from Beechmount stated that his convalescence was uneventful.

13th. January, 1948.

Reporting back. He stated that he was quite well. Staying on diet. Told to report in one month.

10th. February, 1948.

Reporting back, and states that he is keeping very fit, and well. He was starting light work the following day. Told to report in two months time.

7th. April, 1948.

Reporting back. He states that has had what he calls attacks of "gastritis". He vomits after nearly meal which relieves a burning pain, which is more or less continuous. The vomit usually contains the previous meal. On examination, the upper abdomen presented slight tenderness. Marked splashing was obtained. A stomach tube was passed, and about thirty ounces of blackish -brown fluid obtained.

It was decided on this occasion to re-admit the patient.

Part II.

Re-admitted. 18th. April, 1948.

Discharged. 28th. May, 1948.

History.

The patient states that for the past four weeks he has had vomiting after every meal. For the past three weeks he has had a persistent pain in the upper abdomen. During this time his appetite has been poor. He states that he could eat a big meal when discharged from Beechmount. He now finds himself unable to do so. His weight has been steady, Bowels regular, and urine normal. He has had very little sleep lately.

EXAMINATION OF SYSTEMS.

General Appearances.

His general condition appeared very good. He looked tired.

Alimentary System.

Appetite. This has been very good till a few weeks ago, when he began to have no wish for food.

Thirst. He was inclined to feel thirsty.

Dysphagia.

He has no difficulty in swallowing.

Pain. A dull ache has persisted in the upper abdomen for the past three weeks.

Feeling of weight.

This has become apparent on several occasions after a large meal.

Distension.

This has been very slight recently.

Flatulence.

This has been very rare.

Heartburn, Waterbrash, and Nausea.

There has been a lot of nausea lately before and after meals.

Vomiting. This has been a common occurrence for the past four weeks. It has occurred after meals, and has become more severe lately.

Action of Bowels.

These have been quite regular.

Lips. They are dry in appearance, and also to the touch.

Tongue. Furred, and dryish.

Teeth. False.

Abdomen. General.

The abdomen moves freely, and equal on both sides. The two upper right paramedian scars of his previous operations are observed.

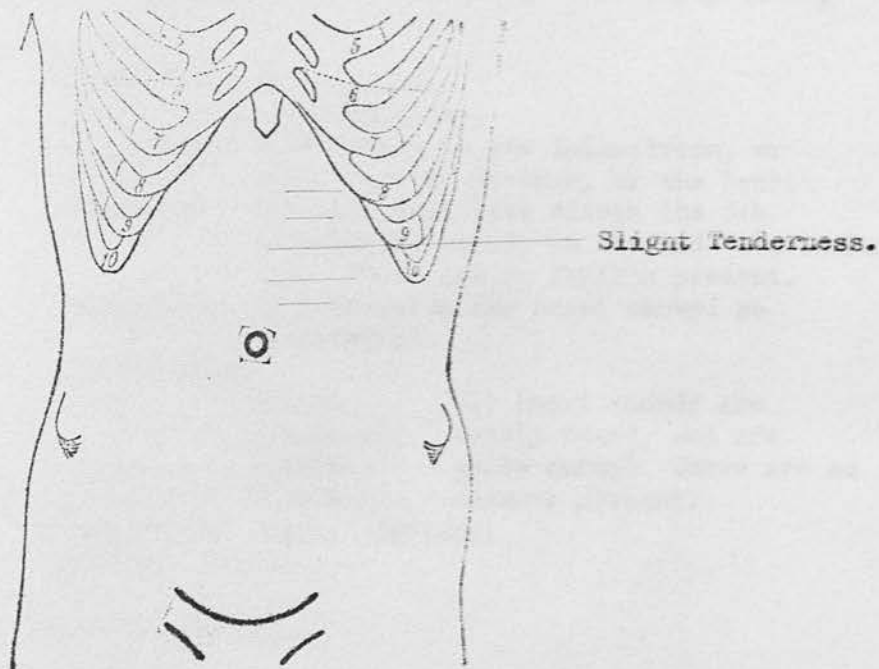
Palpation.

No rigidity can be made out, but slight tenderness can be elicited to the left side of the Epigastrium. This tenderness was worse when the stomach was full.

No splashing was obtained as the stomach had been recently aspirated.

Percussion.

This revealed no abnormality.



Circulatory System.

Dyspnoea. None.
Palpitations. None.
Pain. None.
Faintness. None.

Arteries.

Pulse. Between 70-80 per minute.
Rate. Average.
Rhythm. Steady.
Force. Medium.
Systolic. Above average.
Diastolic. Above average
Nature of the vessel wall. Not palpable.
Nature of the pulse wave. Regular.

Blood Pressure.

By use of the Sphygmomanometer:-

Systolic. 170mmHg.

Diastolic. 105mmHg.

Veins. No abnormality.

Capillaries. There is no cyanosis, or dropsy present.

Heart.

Form of the Praecordium.

No abnormalities.

Pulsations. None either in the Epigastrium, or upper part of Sternum, or the Neck.

Palpation. The apex beat lies within the 5th. intercostal space, on the mid-clavicular line. There are no thrills present.

Percussion. On percussion the heart showed no enlargement.

Auscultation.

Mitral.	All heart sounds are
Tricuspid.	easily heard, and are
Aortic.	quite normal. There are no
Pulmonary.	murmurs present.

Rate of the Heart. Average.

Rhythm. Regular.

The Pulse is present.

Respiratory System.

Nothing abnormal was observed.

Urinary. System.

Nothing abnormal was observed.

Nervous System.

Nothing abnormal was observed.

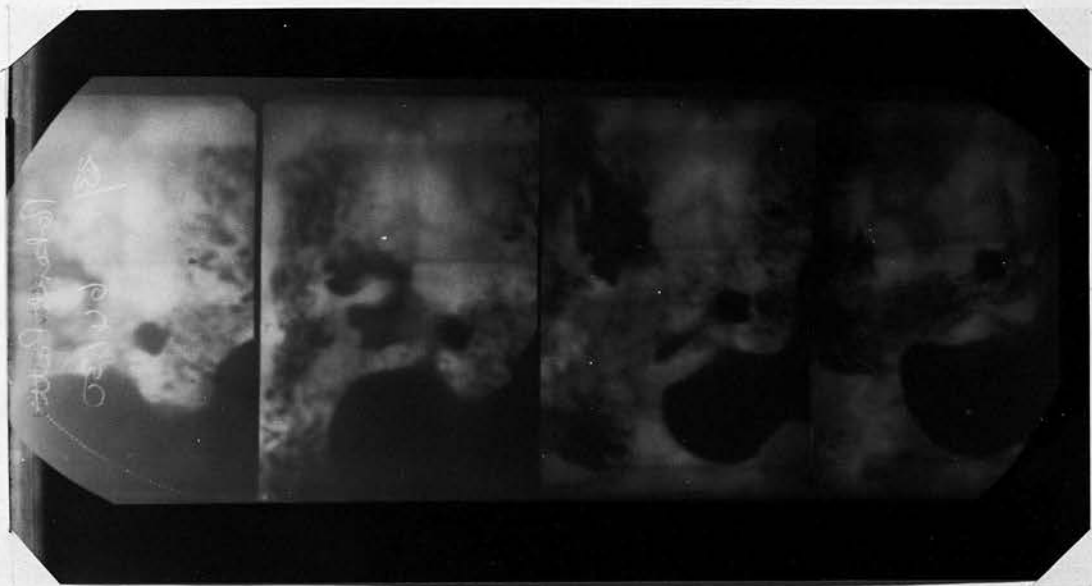
Endocrine System.

Nothing abnormal was observed.



X-ray Report. 23rd. April, 1948.

Oesophagus and Stomach. Negative. The duodenal cap shows an ulcer deformity with an ulcer crater at its base.



X-ray Report. 23rd. April, 1948.

The duodenal cap shows an ulcer deformity with an ulcer crater at its base.

Haemopoietic System.

19th. April, 1948. Hb. 58%.

20th. April, 1948. R.B.C. = 4,460,000 per cu. mm.

C.I. = 0'7.

Integumentary System.

Nothing abnormal was observed.

Locomotor System.

Nothing abnormal was observed.

Progress Pre-operatively.

On the 23rd. April, 1948, the patient was X-rayed, and given a Barium Meal.

Report of the X-ray.

Oesophagus and stomach. Negative.
The duodenal cap shows an ulcer deformity with an ulcer crater at its base.

A Fractional Test Meal also done on the patient showed a high acidity in the stomach.

From the history, and examination of the patient a tentative diagnosis of Cicatricial Pyloric Stenosis was made.

The treatment recommended was that of the Operation of Partial Gastrectomy.

For the few days after admission before operation, he complained very severe pain. An intra-gastric drip of diluted, citrated milk was given continuously, day and night., which relieved his pain. During this period however, his upper abdomen became markedly distended after food, etc.. As a result of this, he vomited about once a day. The amount varied on occasion, the highest being sixty ounces. The vomit consisted of broken down food, or food he had just taken.

The patient received a slow intravenous drip of saline, on the day and night before the operation. One hour before the operation, he was started on a pint of crossed matched blood.

Premedication.

Morphine. gr. I/6.

Atropine. gr. I/100.

By subcutaneous injection.

Operation.

29th. April, 1948.

Surgeon. Mr. Ross.

Anaesthetic. Pentothal,
Oxygen, Cyclopropane.

Nature of the Operation. ' Partial Gastrectomy'.

The abdomen was opened through a right upper para-median incision. The stomach and duodenum were identified. There was a chronic ulcer on the anterior wall of the first part of the duodenum. This perforated on examination, and was later repaired with several sutures, and covered by a piece of duodenum.

The lesser sac was opened, and the vessels along the greater curvature divided between ligatures until the short gastric vessels were encountered. The vessels of the lesser curvature were then dealt with. An occlusion clamp was placed an inch and a half proximal to the pylorus, and with an occlusion clamp just distal to it, the stomach was divided between them. The mucous membrane of the pyloric stump was dissected free, transfixed, and the redundant portion removed. The muscular, and peritoneal coats were then sutured over the stump in two layers. Clamps were placed on the stomach at a higher portion to allow the removal of two-thirds. This part was then removed.

The first loop of the jejunum was brought anterior to the colon, and applied to the stomach, the proximal end of the loop to the greater curvature. Stay sutures were inserted. Clamps were applied, and the stomach, and jejunum opened.

The anastomosis was completed in six layers, the upper portion of the opening into the stomach being closed blindly to give a valvular opening. A lateral anastomosis was then made between the loops of bowel. The abdomen was then closed in layers, without drainage, with catgut. Four deep interrupted silkworm gut stitches were put in, and the skin layer closed with interrupted silkworm gut.

Progress after the Operation.

After the operation he received one further pint of blood, and a pint of plasma. Glucose and saline were then started. The patient's condition post-operatively was very good.

In the proceeding days he made good progress. He developed some bronchitis, for which Penicillin was given on the 2nd. May, 1948, the dosage being 30,000 units, four hourly. This was discontinued on the 17th. May, 1948. A little inflammation developed at the side of the drip, but this was satisfactorily treated.

18th. May, 1948.

His condition was very good, and he was discharged to Beechmount Convalescent Home, on strict diet.

2nd. June, 1948.

Reporting back. He states that he is feeling very well, and fit. He was going for a period to another Convalescent Home, which was associated with his work.

30th. June, 1948.

Reporting back. He states that he is very well, and was told that he was fit for light work.

22nd. September, 1948.

He is feeling very fit, and doing his work all right. He was asked to report back in three months.

Pathological Report.

Robert Putt.

Specimen. Part of a Stomach.

Macroscopic.

The specimen consists of the distal half of a stomach. The segment is average in size, and shape, but more thick walled than usual. It is lined by a normally coloured and rugous mucous membrane devoid of any ulceration, and shows anteriorly diffuse fibrous thickening of the serous aspect, while the posterior serous surface is normal, except for slight adhesions in the pyloric region. Section of the wall reveals an unusually well developed whitish, fibrous framework running through it.

Microscopic.

The mucous membrane is moderately infiltrated, especially in its superficial region with round cells, and eosinophils while a slight infiltration with similar cells is present in the submucous, muscular, and subserous layers. The subserous coat also shows diffuse oedematous fibrous thickening. The condition is chronic gastritis accompanied by serosal fibrosis.

Differential Diagnosis.

The differential diagnosis in the case of obstruction at the pyloric region includes the following diseases:-

- Chronic cholecysto-duodenal ligament.
- Foreign bodies in the pylorus or duodenum.
- Diaphragmatic hernia.
- Gastritis.
- Gastric ulcer.
- Duodenal ulcer.
- Pyloric stenosis.
- Gall-bladder.
- Appendix.
- Post-vagotomy syndrome.
- Duodenal ileus.
- Duodenal diverticula.
- Hypertrophy of the pylorus.
- Carcinoma of the stomach.
- Sarcoma of the stomach.
- Duodenal carcinoma.
- Carcinoma of other parts of the body.
- Alkalosis, and acidosis.
- Chronic uraemia.

Chronic cholecysto-duodenal ligament.

Occasionally this ligament compresses the first part of the duodenum, and may simulate a case of obstruction at the pylorus. Symptoms of obstruction would gradually appear. The condition when it does appear, arises usually in early adult life.

Foreign bodies in the pylorus or duodenum.

There is usually a history of some foreign body having been swallowed by the person, and if obstructive signs appear, they are usually soon after the swallowing of the object. There is a wide range of objects, these being from coins to hair, which forms the hair-ball or trichobezoar which might cause marked obstruction.

Diaphragmatic hernia.

This condition may be congenital, or acquired. The acquired is traumatic, the commoner, and non-traumatic. It may give rise to no symptoms, or it may be associated with disordered stomach or bowel function. Obstruction in this case is usually acute. Examination of the chest shows the presence of anomalous features, and the diagnosis can be made by x-ray.

Gastritis.

This condition may be either acute or chronic. The cause of the acute case is a very variable one. It ranges from 'errors of diet' to toxic and symptomatic causes such as uraemia. In the mild type the patient tells of abdominal discomfort, anorexia, nausea, and vomiting giving relief. The severe type has a sudden onset, and a fever develops. There is vomiting of food and then bile. There is epigastric tenderness, and distension of the stomach by gas. The duration is for two to three days usually. In the chronic type the cause is also varied, the causes being of a chronic nature, such as chronic disease of the gall-bladder. The patient may complain of loss of appetite though this may be normal. Heartburn, epigastric discomfort, and flatulence follow meals, but the relation is not so regular as in peptic ulcer. In the other type of case there is anorexia, vomiting, mainly saliva and mucous and a little food. On x-ray examination the motility may be normal, or there may be rapid emptying or combined periods of inertia. The patient showed his symptoms for a long time, and his main symptom was the vomiting up of large quantities of food at a time, i.e. his food not passing onwards. The patient suffered a very severe burning pain in the upper abdomen which may be attributed to a gastritis. The patient himself when he returned to the ward with a recurrence of symptoms, he himself stated that he had 'gastritis'. We must also remember also that the pathological report tells us that the piece of stomach removed showed some chronic gastritis, but also the presence of other pathology, which was the cause.

Gastric ulcer.

This condition is more often found in males over the age of forty. There are various types of onsets. They may be latent, the first symptom being a perforation. Insidious, the symptoms being indefinite at first and later becoming more characteristic. The first is usually pain, which is often placed in the epigastrium, but may be in the back, or spreading round the left side. It may even be low down in the epigastrium. It recurs at fairly regular intervals, usually one-quarter to two hours after a meal. The duration of the pain is usually one hour and it is relieved by alkalis or vomiting. Deep tenderness may be elicited in the epigastrium. Vomiting is common but not invariable, and usually occurs at the height of the pain, when it gives relief. The quantity vomited is small, the vomit being acid fluid with partially digested food. Radiographs are nearly always diagnostic. When the patient complained of his trouble it was already known that he had a duodenal ulcer. His pain was more or less continuous, and his vomiting when it did occur was of large quantities. Radiographs showed that there was no gastric ulcer present.

Duodenal ulcer.

This condition is more prominent in men than women. The patient usually tells of an insidious onset of periods of dyspepsia, which gradually pass into periods of pain which comes on about two to four hours after a meal. the pain being of the hunger type. It is quite regular, and is eased by food or alkali, but not by vomiting. It is situated to the right of the epigastrium. Tenderness may be present. Waterbrash is a common complaint. Vomiting is uncommon. The appetite is often good, and constipation is usual. Radiographic examination usually gives the diagnosis. The patient complained that he had the vomiting first which occurred after every meals, and when his pain arose, it was continuous. Radiographic examination however showed the presence of a duodenal ulcer. Duodenal ulcer however certain complications and it might be one of these.

Pyloric stenosis.

This condition arises in three ways. The first is by cicatrix of an ulcer. Here in ninety per of cases the cause is a duodenal ulcer. Another cause may be a neoplasm of the region. The third is pylorospasm or oedema of the mucous membrane. At first the symptoms may resemble an ulcer, pain being severe and spasmodic and related to food. Peristalsis may be visible, and on palpation splashing as in a dilated stomach. If a tumour is the cause it might be palpated. Radiographic examination may show the stomach to be normal in size and shape. The meal retained for hours, and peristalsis very strong. As the disease goes on, there is a sense of fullness, and anorexia. The quantity of vomit is large and at irregular intervals, giving temporary relief. There may be gastric uraemia, and tetany present. Radiographs show a prolonged emptying time, bowl-shaped area as in atonic dilatation. The patient already gave a history of a duodenal ulcer and the history of two operations for a perforated ulcer. The pain was reasonably severe, and he had a sense of fullness, and his vomit was of very large quantities, which occurred at irregular intervals. Radiographic examination showed the presence of a duodenal ulcer. Thus the cause was reasonably apparent, either due to cicatricial formation or oedema from an active ulcer.

Gall-bladder.

Certain conditions of the gall-bladder may simulate disease in the area of the pylorus area. There is pain, which usually in the area of right costal margin. This pain may pass to the back or to the right shoulder. There may be a lot of flatulence, and a fullness of the epigastrium. Jaundice may be observed. Tenderness is usually present, and is most marked over the region of the gall-bladder. The pain is not so definite in time as in ulcer, and is not so often relieved by alkali.

Appendix.

In this disease if it is an acute attack, there is some epigastric pain, and nausea and vomiting may occur. The pain usually later passes to the right iliac fossa. When it is chronic there is digestive upset, and pain and vomiting may be present, though not usually severe. There is tenderness and slight rigidity over the appendix. Radiographic examination shows the absence of a lesion in the stomach or duodenum.

Post-vagotomy.

Sometimes after the performance of a vagotomy operation, certain complications arise. These are a persistent ulcer pain, and distension is common, with eructation of a foul-smelling gas. There is usually a six hour delay shown by a barium meal, and vomiting may be present. However in this condition there is the report of the operation having been carried out.

Duodenal ileus.

This condition is a recurrent dilatation of the duodenum, where no anatomical or pathological cause of constriction is obvious. It is commonest in viscerotonic women, but is not restricted to them. They give rise to repeated bilious attacks of right upper quadrant pain and distension.

Duodenal diverticula.

This condition may be congenital or acquired. Acquired diverticula of the second and less commonly the third part, are usually from a congenital weakness of the duodenal wall, and appear in the middle age. The first part diverticula are usually the result of an ulcer. It is the result of the healing of the ulcer. They very usually show no symptoms and are only found at death, but they may show signs of a duodenal obstruction.

Hypertrophy of the pylorus.

This condition may appear in adults, and may be considered if symptoms have been present from birth, if the diet has been restricted through out life to small frequent meals, and if the muscle of the pyloric canal is obviously hypertrophied to the eye. Radiographs show with the opaque meal a dilated stomach with a smooth conical termination and delay in emptying. The circular fibres of the pyloric canal have been found to be increased.

Carcinoma of the stomach.

This condition is most common after the age of forty-five. The history is of short duration. Gastric symptoms are frequently present and may simulate those of ulcer. In other cases the symptoms may be those of general debility, loss of weight, anorexia. There may be tenderness of the region. The tumour at the pylorus may be palpable. If it becomes

obstructive in character, there is copious vomiting of gastric contents. The vomitus which has a foul odour, contains undigested food. The stomach is dilated and splashing can be easily elicited.

The patient showed a short history of his symptoms pointing to obstruction, and though his vomit was of large quantities and of the food that he had taken, there was no apparent change in his weight. He had also had a duodenal ulcer which would partially go against the diagnosis but would not rule it out.

Sarcoma of the stomach.

This tumour is a very rare one, but occurs in about one per cent of cases of tumour growth of the stomach. It is more common in males and appears to be present about the age of forty-five.

Duodenal carcinoma.

Simple tumour is a very condition, while carcinoma formation, is regarded as really never occurring from a duodenal ulcer. The occurrence of it alone, is not very common, and would appear to be in the region of the ampulla where increasing jaundice is markedly present before obstruction occurs.

Carcinoma of other parts of the body.

The spread of tumour from neighbouring organs may affect the duodenum or the pyloric region. There is usually signs however of the primary growth present.

Alkalosis, and acidosis.

Alkalosis may arise from an increase in the alkali reserve by massive dosage of the person with alkalis. Loss of chlorides, such as in persistent vomiting, cramp may be the cause. At first there is anorexia, malaise, and headache. Later there is thirst, nausea, vomiting, and constipation. There is dizziness, and tingling and pains in limbs. The patient becomes nervous, irritable, and drowsy, passing to tetany or epileptiform convulsions and finally becomes comatose. The pulse is rapid, and respiration slow. The blood-urea is raised.

Acidosis is commonly applied to the presence of ketones in the urine. There is however correctly a diminution in the alkali reserve of the blood.

Certain causes are put forward for it being present. These may be diabetes, starvation, cyclical vomiting, administration of acids, etc. The symptoms vary, and may be nausea, vomiting, pain in the epigastrium or throat. With these conditions the diagnosis may in most cases be made from the history of the disease causing the symptoms.

Chronic uraemia.

This condition occurs in chronic nephritis with a blood-urea over 150 mgms. The onset is generally insidious, with headache, vomiting which may be uncontrollable, nausea and hiccup. Vomiting sometimes only follows food. Cerebral or respiratory symptoms may be present. The other signs or history of chronic nephritis is usually found.

This patient, Robert Putt, aged thirty-six years, was first seen when he was brought to the Royal Infirmary, Edinburgh, and taken to the Surgical Out-patients department. His complaint was that of an acute onset of upper abdominal pain, which had started in the evening. The pain was stabbing in character, and appeared to be generalised. There were no other symptoms. Examination showed that his whole abdomen was rigid, and tender all over, though maximum in the right hypochondrium. The diagnosis was made of a perforated ulcer. The patient had already been admitted to another ward of the Royal Infirmary, six months before with a perforated ulcer. The patient was admitted to the ward, and rested. He was operated on that night and another perforation was found in the duodenum. This was closed, and the patient returned to the ward. He made a very satisfactory recovery. Post-operatively he was placed on penicillin, and gastric suction, with a saline drip intravenously. The patient was discharged on a diet. For the next three months the patient on reporting back was very well. However in April he showed signs of what the patient called 'gastritis'. He was complaining that for the past four weeks he had vomited after nearly every meal. His appetite had become poor, and his sleep was becoming affected. He was feeling alright otherwise. On examination slight tenderness was found in the upper abdomen to the left of the epigastrium, and this was worst when the stomach was full. When the stomach was tested for splashing some hours after a meal, it was found to be present. X-ray examination showed that the duodenal cap showed an ulcer crater and deformity. A fractional test meal showed a high acidity in the stomach. From these factors the diagnosis of Cicatricial Pyloric Stenosis was made and the operation of partial gastrectomy decided upon. This operation was carried out, with the patient receiving blood. At this operation a duodenal ulcer was found which perforated on examination, and was closed. Part of the stomach was removed, and the jejunum brought up to the stomach. The operation was carried out with difficulty due to the presence of adhesions. The patient made a very satisfactory recovery from this operation, and nearly six months after his operation was able to return to work, having no trouble from his ulcer which we must remember was invaginated with the duodenal stump, and not removed.

Discussion.

Aetiology.

In this discussion on Chronic Duodenal Ulcer, I would like to start with the possible formation of such an ulcer, and its course from that point, and bring in in their respective parts, the occurrences of the case. Duodenal ulcer is a common condition, which occurs in men, especially between the ages of thirty and fifty, usually in thin, nervous people, of the educated, and professional classes, thus frequently in medical men. It is a rare complaint in women in England, though in Scotland it appears to be more frequent. The frequency with which the duodenum is attacked, as opposed to the stomach, varies enormously in different localities. The relative incidence of duodenal ulcers to gastric ulcers in London, is 1.2 to 1., and in Leeds, is 4.4 to 1., and in Scotland, it is 11.6 to 1. Because of the marked frequency of duodenal ulceration, it has become a very important, and a very well known disease even to the lay-person.

Regardless of the large number of cases, no definite statement has yet been made as to its aetiology.

It is wrong however to say that little research has been done on this disease, as quite the opposite has taken place. Thus because of this research we can put forward several factors, which, though not definitely positive, must from the proofs offered for them, be very close.

It is best in discussing the aetiology of duodenal ulcer, to combine it with gastric ulcer, as both are very much associated, due to their close proximity, their similar structure, and their similar bearing in ulceration.

It is possible to divide the known facts into various groups, and study each group separately. The first group could be called the general group, as its contents are a varied number of factors which do not appear to be linked in any direct way.

The first is sex incidence. In regard to this, it is interesting to note that in the past many cases of ulceration were reported in women, especially of the gastric type. Nowadays, it is man who is chiefly affected by ulcer in either the stomach or the duodenum. This fact has become more apparent in the mortality rates in regard to perforation of an ulcer. Jennings, (1940) who studied these facts, shows that the deathrate in women has gone down remarkably, while in the case of man, the death rate has gone up. The reason for this is difficult to demonstrate. Whether it lies in the change in the outlook women have, since the quiet, refined days of the Victorian period, it is difficult to say. These changes though would however give you the impression that the incidence in women would go up too, but perhaps at this point an unknown factor has come into play. The seasonal recurrence of symptoms must also be noted. The symptoms mainly appearing in the Spring, and Autumn. Fewer deaths are also noted in the summer months. It is suggested that these may be attributed to the change in the metabolism the patient at these times. (Practitioner, Jan. 1949).

Perhaps here the cause of this might be the change in the person's outlook at these times of the year.

The question of heredity must be thought of in ulcer disease, as it must be in every disease. This factor is well established in the causation of ulcer as there seems to be no doubt that families of peptic ulcer patients have a greater incidence of ulcer than families of non-ulcer patients.

In a group of one hundred and thirty men, and thirty-two women, with peptic ulcers, whose cases were examined completely, it was observed that analysis of the family incidence of gastric disease, and indigestion, suggested from the results obtained the existence of a definite hereditary factor. (British Medical Journal). One man has gone so far as to show that the familial tendency was present in more than ten per cent. of cases. It has been put forward by some people that cases of duodenal ulceration in identical twins, of which four to five cases have been reported, could be used as proof of the hereditary factor. (British Medical Journal). However in regard to this statement we must look upon these cases from other points of view too. As twins they must be susceptible to most of the factors, known and unknown, which go to cause an ulcer. So even if there is a hereditary factor they are both affected by the other factors as well.

The factor of race can not be definitely fixed. This is a factor which must vary in every part of the world. Ulcer disease is often attributed to the change of man to civilisation. Here however we fall down, because in odd parts of the world, where people are not up to the high civilised standard which we class ourselves to have reached, ulcers are common. In Southern India you would not class the low peasant class, to be highly civilised, and yet ulcer incidence is rated high. Here however we come upon another fact, which rears its head, that of malnutrition, which might account for this occurrence in India, because here the majority of people are always in want of food.

One surgeon has noticed that of the many people that he has operated on for perforation of an ulcer, were all dark hair, and in fact he can not remember any fair haired cases at all. (British Medical Journal). This may be explained perhaps that fair haired people seem to be of a more cheerful temperament, and thus disinclined to ulcer formation.

Trauma has been put forward by some people, but it is difficult to appreciate this factor. The duodenum is a part of the intestine which is not liable to be injured easily. Perhaps the drinking of very warm tea or some such liquid might lead to ulceration, but if so why at the fixed sites. Trauma of a part of the body other than the stomach or the duodenum, causing an ulcer has been noted in the formation of 'Curling's Ulcer'. This ulcer occurs in the first part of the duodenum. It is usually associated with extensive burns of the body.

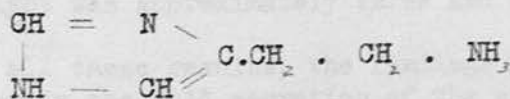
This type of ulcer has now been attributed to a histamine-like substance, which is liberated from the septic area, and is known to produce a hyperchlorhydria, which is associated with ulcer disease of the duodenum, and will be discussed later. During 1928-1937, Sandweiss et. al. discovered only one case of proved duodenal ulcer in 70,310 pregnancies collected from five hospitals in Detroit. Whether this is due to the change in the sex hormones, which take place in pregnancy, or due to the change in the person's attitude, which is usually to a pleasant one, it is difficult to say.

One more general factor must be put forward, and this was suggested by a Surgeon. He thinks that the glands at the appendix are infected first, and it spreads from here to the duodenal glands. When the supra-duodenal glands are affected you get a duodenal ulcer, and when the intra-duodenal glands are affected you get infection of the gall-bladder.

Thus from the general factors, there is not one which stands out pre-dominantly as a direct cause, but more as indirect, or secondary ones.

Certain conclusions have been reached after a large amount of experimental research which has been done on the intra-gastric factors. From the pathological study of ulcers it is noted that ulcers appear in areas which are in close proximity with acid and pepsin. Thus we have stomach ulcers, first part of the duodenum, and small bowel ulcers in close proximity to a Meckel's diverticulum, which contains gastric mucosa. After the operation of gastro-enterostomy, where the jejunum is anastomosed to the stomach, you often find ulcers occurring at the point of anastomosis or nearby. Here the bowel is in close contact with the hydrochloric acid and pepsin from the stomach, with which it would not normally come into contact with. Thus the production of hydrochloric acid and pepsin or one of the two appear to be needed for the occurrence of an ulcer.

A great deal of work has been done on this part of the subject. To obtain any resemblance to ulcer pathology, the drug Histamine was used. Histamine is a base which can be prepared from histidine by the removal of carbon dioxide.



It has three actions:-

- I. Causes contraction of nearly all plain muscle.
- II. Dilatation of the capillaries.
- III. It is a very powerful stimulator of the gastric juice.

It is the last one that interests us. When histamine is injected subcutaneously so as to maintain a low concentration in the blood for a long time, you get a secretion of gastric juice, which is rich in acid but poor in enzymes. The latter part poor in enzymes should be noted.

Orndorff, Bugh, and Ny, at first tried injecting dogs with two mgs. of histamine in water, at two hourly intervals, ten times a day, for sixty days. They only obtained infrequent superficial duodenal erosions, and no persistent or deep erosions. Code, and Varco, however, giving daily injections subcutaneously of thirty mgs. of histamine in a beeswax base, produced peptic ulceration regularly in dogs. Owen Wagenseil recorded the same results in various animals, some showing more restraint than others. From work done then it would appear that it is excess acid which must do it, as stated above, histamine gives a secretion poor in enzymes.

Fawley and Ivy found that if they removed the duodenum in dogs, and brought the jejunum up to the pylorus, an ulcer occurred. If however the alkaline secretions of the intestine were passed into the stomach, or if the fundus of the stomach was excised, an ulcer did not occur. Here again the question of acid as a possible cause arises. Thre (1939) has reported on his studies of gastric secretion. He showed that in gastric ulcer it appears that the rate of secretion is within normal limits, while in duodenal ulceration, the rate of secretion is definitely raised. With regard to acid concentration, duodenal cases showed values equal to the highest in the normal series. He states that hyperacidity in the precise meaning of the term is without any experimental foundation, whereas the total output of acid in duodenal ulcer cases is greater than normal. This last part would fit in with the change from the Gastric Test Meal, to the Night Secretion Test. He also studied the pepsin values of gastric juice and found that particularly in chronic duodenal ulcers, the concentration and output of pepsin may be increased. Another point of interest in acid secretion, are the results shown by Levin, Kirsner, et al. (1948), that in duodenal ulcers the output of free hydrochloric acid during the night was approximately three and a half times as great as in normal people.

Thus we have from all these results, the findings that in a duodenal ulcer, there is a great increase in the acid secretion of the stomach juices, and also in the pepsin secretion. Most marked of all perhaps is this secretion by night, which is used as a test, and will be demonstrated later.

We thus have perhaps part of the cause of an ulcer. Because of this we must think of two things:-

- I. How this excess secretion could come about.
- II. How this excess secretion causes ulcer formation on the intestinal wall.

Two phases of secretion are recognised, which if in excess might cause the rise in secretion.

These phases are :-

- I. A nervous one produced by the sight of food or the thought of food which utilises the vagal pathway.
- II. A gastric hormone which causes liberation of secretion, when stimulated to do so by certain foods.

In the majority of ulcer cases you find that the person shows obvious nervous signs, and even if these signs are not obvious, on closer observation and discussion with the patient they usually appear. Draper stated that a special anthropometric type was predisposed to ulcer formation. He described such a person to have a long, narrow face with deeply etched naso-labial folds, and special features of cranial shape. The clearest evidence of predisposition is said to be found in the nervous constitution or the temperament of ulcer patients, who are commonly described as 'vagotonic'- lean, energetic, restless, overconscientious, - and is most marked in duodenal ulcers. These appearances are quite common, in fact common enough for people to say that a certain person looks an ulcer type, and in the majority of cases the people are right.

This marked nervous tension is shown by the high incidence of business, and professional men, whose work is largely mental, in opposition to the labourer's work, which is physical. Thus business and professional men become mentally tired more easily, and are thus more prone to worry. It is interesting to note here that when a patient with an ulcer, causing him symptoms, and is relieved of either part or whole of his worries, his symptoms usually improve.

Davies and Stewart showed that haematemesis, a complication of an ulcer, commonly follows after acute worry, and similarly the incidence of perforation increased in areas of heavy bombing during the war. In a special analysis of ulcer cases in regards to their psychological characteristics, it was stated that the preponderant characteristics of the male patients as a group were their energetic disposition, and their tendencies to anxiety, irritability, and hypochondriasis. They tended to correspond with the obsessional personality type. Actual neurosis was uncommon, and the incidence of extra-ordinary causes of psychological stress was small. The stresses observed were principally those inseparable from an ordinary life today. The women showed a considerably higher incidence of constitutional instability than the men. Thus we have a certain type of person, and perhaps a sufficient cause for an ulcer.

We must now find a way for transferring these emotional upsets to the stomach.

The Vagus nerve supplies the stomach with motor, and secretory stimulations.

These fibres arise in the Medulla Oblongata. Thus if you get an increase in these stimulations you would get increase motility, and an increase in the secretions of the stomach, i.e. hyperchlorhydria.

Babkin suggests the possibility that vagal impulses cause liberation of histamine in the gastric mucosa.

Through its vasodilator action, and stimulating effect upon the parietal cells, conditions favourable to ulcer production are provided, namely high gastric acidity, and through capillary stasis, defective blood supply to the mucous membrane.

Cushing was the first to draw attention to the relative high incidence of gastric ulcers after intra-cranial operations.

Beattie produced areas of hyperaemia and small erosions in the gastric mucosa by stimulation of the hypothalamus in the region of the tuber cinereum. Kellie has observed ulceration of the stomach and proximal duodenum after lesions of the hypothalamus. Other people who have done work on stimulating this area, show increased gastric secretion, and gastric hypertonus, which are prominent features of duodenal ulcer.

We thus have several facts which all appear to have connections to ulcer formation. Thus emotions which would be in the cortex of the brain might affect the hypothalamus, and from there pass to the vagal centre, and to the stomach. There is yet no definite proof that this is the case.

It is interesting to note however of a case that Wolf and Wold had of a man, who had a gastric fistula. When this man was under nervous tension, it was noted that there was an increase in gastric secretion and gastric motility. The other phase of secretion is that by hormonal control. A hormone can be liberated from the pyloric mucosa, free from histamine, which stimulates gastric secretion in animals, and this has been named 'gastrin'. Sacks and Ivy (Best and Taylor) however said that there was histamine in it, and the stimulation was due to this. It is thought that the liberation of this hormone is dependant upon the type of food eaten, but others think that it comes from stimulation of the vagus nerve.

We must now think as to why or wherefore, the increase in acidity, and other affects that go with it, an ulcer appears in the areas that ulceration takes place.

In normal life, the stomach and the duodenum appear to be protected by some unknown substance from being digested by its own juices. The most obvious thing is the secretion in the stomach and the duodenum of mucous, and it may be due to a coating of this, that the muscle wall etc., are protected. Perhaps in some way the mucous glands fail to secrete and thus leave open an area for digestion, and thus the formation of an ulcer. As to the reason why this should occur in the certain specific parts of the stomach, and duodenum it is difficult to explain. Here Virchow has suggested that it may be due to infection, and thrombosis of one of the end arteries of the stomach or duodenal walls. Kosenow thinks it may be due to an infection confined to a small area. It would be interesting to know if the very fine blood vessels in the ulcer bearing areas were abnormal from normal parts of the stomach or duodenum. The question of infection, suggested by Kosenow, is backed by many people.

It is of interest to note that many people, who have ulcers, can tell of having chronic nasal trouble or an apical tooth abscess. It is thought that a haematogenous infection from the septic foci with a low grade of virulence is set up, which may cause a foci of inflammatory nature in the ulcer areas. Thus the actual cause of an ulcer is stated as unknown, but surely with the passing years new information comes to light, such as the new operation of 'Vagotomy'. This entails the cutting of the vagus nerve, and after this it is noted that the course of ulcers improve considerably, so perhaps, the Vagal theory is a correct one, or at least very near to it.

In regard to the aetiology of the patient's chronic duodenal ulcer, we find three points of interest. The first is the amount of worry that the patient had over his wife, who was not well, and after she died, he developed a perforation. From laboratory examination, it is observed that he had a high gastric acidity. Thus we have two factors which are thought to account for ulcer formation, namely worry, and a high gastric acidity. The other factor of interest, is the appearance of the patient. He was a tallish man, who looked his age, and in fact looked older at times than he really was. He had the appearance of having had a lot of worry, thus fitting into the ulcer class.

Pathology.

Peptic ulcers may develop on any part of the alimentary tract which is exposed to the action of the gastric juices.

Thus you can get them in the stomach, duodenum, on the distal portion of the oesophagus, in the jejunum after the operation of gastro-enterostomy, and rarely in a Meckel's diverticulum, with gastric mucosa.

Acute ulcers occur in any part of the duodenum, and may be single, but are often multiple. They arise from a variety of causes, and are common in the later phases of many acute infective and toxic conditions. The development of the duodenal ulcer that follows extensive burns belongs to this type. Acute ulcers are round or oval, and at first they are mere erosions of the mucous membrane. If they extend they penetrate the deeper coats of the wall by progressive sloughing, which diminishes in extent as the ulcer deepens, and gives the ulcer a characteristic terraced appearance. Acute ulcers are apt to erode arterioles and to cause haemorrhage. Less commonly they penetrate all coats, and perforate suddenly into the general peritoneal cavity.

Microscopically there is often a striking absence of inflammatory change, and apart from some oedema the surrounding wall may show little deviation from the normal. These acute ulcers heal rapidly, and very few persist, and become chronic.

Chronic duodenal ulcer is always limited to the first part of the duodenum, and appears more often on the anterior surface, than on the posterior surface. The area usually affected is the part half to one inch from the pylorus of the duodenum, and often called pyloric ulcers are actually in the duodenum.

Two or more chronic ulcers frequently coexist. The name of 'kissing' is given to two such like ulcers in the duodenum. Often you may have an associated gastric ulcer with the duodenal ulcer. The ulcers are round or oval, varying from about one to five cms. in diameter, surrounded by smooth mucosa which approaches or overhangs the crater. The excavation has a regular, sharply defined edge, and its walls are vertical, extending steeply to the floor of the ulcer. Almost invariably there is a complete breach of the muscle coat, no trace of which is recognisable in the floor of the ulcer. It frequently extends to the serous layer, and about it. The peritoneum over the ulcer may be puckered and scarred, and oedematous tags of omentum cover it.

Microscopically there are four zones which can be distinguished in the floor of a well fixed ulcer:-

- I. An inflammatory zone consisting of fibrin and polymorphonuclear leucocytes.
- II. A zone of necrotic granulation tissue.
- III. A zone of living granulation tissue.
- IV. A zone of dense scar tissue which forms one of the most important features of the ulcer.

This dense scar tissue extends in the submucosa for some distance under the intact mucous membrane, and materially interferes with healing in preventing the approximation of the edges.

Evidence of acute inflammation in the shape of dilated vessels, and foci of chronic inflammatory cells can be seen in the most quiescent scar tissue, showing that irritation is still going on. The vessels are often narrowed by a very marked endarteritis obliterans. The ulcer margin may show epithelium proliferations in the form of downgrowths, and glandular tissue may be found beneath the muscularis mucosae.

These chronic duodenal ulcers are usually associated with marked cicatricial contraction, and this may be so marked as to shorten the distance between the pylorus and the papilla from the normal eight to six point five cms. or less. In connection with duodenal ulcers the examination of the gastric mucosa has been carried out by gastroscopy. (British Medical Journal June, 1946).

Normal gastric mucosa consists of a thick transparent, smooth orange-red lining thrown into many folds throughout the greater part of the stomach. These folds can be straightened out or made to disappear altogether when the stomach is distended with air, and this important point in differentiating the normal from the hyperplastic type of mucosa in which the folds in certain areas remain tortuous even with full inflation.

The gastric mucosa in the prescence of a duodenal ulcer was in the majority of cases, of the hyperplastic type. This manifests itself in the formation of very many crowded, thickened, and tortuous folds, which can not be straightened out even after full inflation of the stomach. These folds are most marked along the posterior curvature of the stomach. In an obstructed case, the condition of the mucosa varies. Viscid adherent secretion and a dulling of or granular change in the surface of the mucosa constantly take place over large areas. The folds may be oedematous and even become broken up into raised nodular segments. This condition is sometimes known by the name of 'chronic hypertrophic gastritis'.

With regard to the pathology of the patient's ulcer, we are left very much in the dark, as it was not removed at operation. We do know however that it had already eroded itself through the duodenal wall, and was about to perforate again.

We can only fall back on the report on the portion of stomach sent to the pathologists. The pathologists report is on the distal half of the stomach. The mucous membrane on the whole appears normal, though the wall shows some fibrous thickening. Microscopically we find the mucous membrane to be infiltrated with roundcells, and eosinophils, as are the other layers to a small extent. The subserous coat showing some diffuse oedematous fibrous thickening. It is surprising to find that even with the marked serosal fibrosis, there is not the obvious visible change in the rugae, as observed on the above mentioned cases of gastroscopic study. The prescence of a chronic gastritis is to be expected, especially with the amount of trouble he had had with the ulcer, and finally his obstruction to the pylorus.

The complications of duodenal ulcer are five in number:-

- I. Perforation.
- II. Pyloric Obstruction.
- III. Haemorrhage.
- IV. Carcinomatous Change.
- V. Adhesions.

These will be described and discussed in their relative parts of this discussion.

Symptoms.

Duodenal ulcer usually has a very insidious onset. For a long time the person may complain of periods of dyspepsia, which may last two to three weeks, and then not reappear for many months. Through time however these intervals become shorter, and shorter, and in some cases you may have continuous symptoms. These symptoms become more obvious, and of a greater severity, usually as time goes on. We can not however be definite on these facts, as the degree of symptoms vary from patient to patient. In some cases, in fact you find that the person has not complained of any symptoms, and it is only when the patient develops a complication of an ulcer, that he is found to have an ulcer.

The patient will probably be a man of thirty-five years of age or over. He may appear to be the true ulcer looking type as mentioned previously in the discussion. The patient will probably not give any appearance of having lost weight. The earliest symptom is generally a sense of discomfort, or fullness about three hours after the largest meals. These are gradually replaced by a definite pain. In the early stages it is likely to occur only after the heavy meals, but it becomes a regular and punctual pain occurring about two to four hours after a meal, i.e. occurring when the stomach is empty. The pain is described as a 'hunger pain', or even as a sinking sensation. Often the pain wakes them up at night, and becomes a typical symptom. This pain is eased by taking food or alkalies, and when a patient, who gets his pain during the night is asked what he does for it, he usually answers a drink of milk or a biscuit. The pain is eased by vomiting, which is rare in uncomplicated cases. The situation of the pain is usually to the right of the epigastrium, and above the umbilicus. Radiation of the pain if present occurs, to the epigastrium, umbilicus, and right side, and rarely to the subscapular region. Occasionally you find the pain is in the centre or even to the left of the epigastrium. The patient's appetite is usually often reasonably good, though some of them become afraid to eat, knowing that they will get the pain at a certain time. Waterbrash is a common symptom. This is the regurgitation of fluid into the mouth. Salivation may be excessive in any irritative condition of the oesophagus, stomach, and part of the duodenum. When the saliva runs down and distends the oesophagus, regurgitation occurs of enormous quantities of tasteless fluid, or in some cases very strong acid from the stomach. Associated with this is heartburn, and frequently occurs, due to the regurgitation of fluids as mentioned above into the oesophagus, and subsequent distension, which is usually felt behind the sternum, but appears to vary greatly in people. Constipation is a very common complaint, while vomiting is an uncommon one, and if present suggests obstruction. The feeling of nausea may be admitted by the patient, but often only on questioning.

Examination.

On examination of the abdomen of the patient, nothing abnormal may be discovered. If the patient is not a far advanced case, and the examination is carried out during a remission, the examination may be negative. In the other type of case various signs may be elicited. Inspection may show no abnormality. On palpation, superficial tenderness may be present, and even deep tenderness only over the site of the ulcer. Muscular rigidity is difficult to make out but is often definite over active ulcers. In far advanced cases splashing may be obtained. This usually signifies retention of food in the stomach, and thus some pyloric obstruction.

Other signs may be noted. The tongue may be furred. The patient usually has artificial teeth, or in some cases no teeth at all.

In more advanced cases the patient may tell of the vomiting up of some blood, i.e. haematemesis, or the sudden call to stool, and some colicky pain, and the passage of 'tarry motions'. These may however be unrecognised by the patient, and their significance will be dealt with later under the complications of an ulcer. We thus have from our symptoms, and signs, certain features, the most marked being the pain, which comes on about two to four hours after a meal, and is relieved by food, and also perhaps tenderness in the upper abdomen.

Because of these symptoms and signs we now pass further in our examination of the patient, by doing certain clinical tests.

These are:-

- I. Gastric Test Meal.
- II. Night Secretion Test.
- III. Insulin Test Meal.
- IV. Radiographic examination.
- V. Occult blood examination.
- VI. Gastrosocopy.

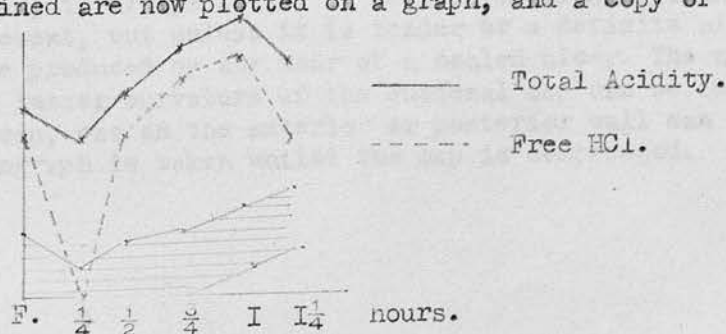
The gastric test meal gives the information about the total acidity, and also the free hydrochloric acid in the stomach, and also the presence or absence of mucous, starch, and bile, in the stomach.

The examination is carried out first thing in the morning, the patient having taken no food or drink.

The patient has a stomach tube passed by the mouth, till the pyloric mark on it almost reaches the mouth and teeth. The fasting stomach contents are withdrawn by gentle aspiration. The patient now drinks a pint of warm watery gruel, after which, at fifteen minute, or half hour intervals, samples of the stomach contents (10 to 15 ccs) are aspirated, the tube remaining in situ for at least three hours. Thus you have either six or twelve specimens, plus the fasting juice specimen.

Chemical examination is now done on the specimens. First of all the naked-eye appearance of each specimen and the amount and colour of both sediment and supernatant fluid are noted. An estimate of the amount of each specimen is made and the presence or absence of bile, blood, and mucous are noted. Every specimen is then examined for free hydrochloric acid and total acidity using special reagents. The results obtained are now plotted on a graph, and a copy of one is shown below.

N/10 NaOH.



In a test-meal in a chronic ulcer of the duodenum, the specimens are usually withdrawn with ease. All deposits are very clear, and the supernatant fluid is clear and colourless. No mucous, or bile are obtained in the specimens, while starch is usually obtained in all the specimens. The test-meal generally shows hyperchlorhydria with a climbing curve, and excess of acid juice in the fasting stomach, and after all the starch has left indicates that this is associated with hypersecretion.

An injection of histamine is often given after the test, and the result noted if there is any secretion which should occur after its injection.

Night secretion tests have come into their own, and some people look upon them as being more important than the Fractional test meal, and in fact do not do the test meal at all now. As from the meaning of the words used in the name of the test, the secretion of the stomach made during the night are withdrawn at intervals. In duodenal ulcer, it is found that the night secretion of acid increases up to even three times its normal amount. This test with the following test play a part in a decision for a Vagotomy on a case of ulcer.

The Insulin test meal is a test used more in the special examination of a case for its suitability for Vagotomy, and is described under such.

The blood examination of the stool is carried out with the use of Benzedine, and when a positive result is obtained, it means if the patient has not been taking anything that might account for it, that there is possible blood loss from an ulcer.

Thus from all these tests we mainly get the information as to whether the acid secretion in the stomach is high, and the presence of blood in the stools.

We now pass onto the next examination, which is that of radiography. This is a more common examination, and is in the majority of cases done before the other clinical tests.

The examination is done by swallowing of Barium, and the course of the substance followed through the oesophagus, stomach, and duodenum, by means of the x-ray machine.

In early cases the x-rays show that the stomach is often of the short high type, and empties itself with unusual rapidity.

In more chronic cases reflex achalasia of the pyloric sphincter may lead to delayed evacuation, and consequently increase in the size of the stomach, the greater curvature of which then reaches below the umbilicus. Irregularity in the outline of the duodenal cap due partly to the deformity caused by the ulcer itself, and partly to spasm, is always found. It affords conclusive evidence that an ulcer has been present, but unless it is tender or a definite niche is seen, the deformity may be produced by the scar of a healed ulcer. The niche formed by an ulcer on the lesser curvature of the duodenal cap can be recognised in the silhouette of the cap, one on the anterior or posterior wall can only be recognised when a radiograph is taken whilst the cap is compressed.

Thus we have a more definite way of diagnosing an ulcer.



Ulcer Crater.

We must now speak about the case of the patient's ulcer up to this time, i.e. to his first perforation.

Unfortunately we find that we are unable to do so due to the absence of notes on this part of the patient's history, and also to the patient's bad memory on this subject.

Treatment.

We now come to the stage where we must discuss the treatment of a chronic duodenal ulcer. Here we are up against a snag, shall we say, as it is regarded that the treatment is a medical problem and not a surgical one, except in certain cases, which will be mentioned later. As this is a surgical discussion I would like to refer to the medical treatment in a small way only. Thus it is very common for the surgical side to receive the patient with a duodenal ulcer, who has been diagnosed, and treated unsuccessfully on the medical side. The medical treatment lies along certain fixed lines.

It is recommended that the patient goes to bed for about one month or more perhaps, depending upon the abatement, if any of his symptoms. The patient is however not totally bed-ridden being allowed up for toilet purposes, etc.. This putting to bed is not always done, because many patients whose symptoms are mild, are treated as out-patients.

At first the patient is reassured, and removal, if possible, of his worry plays a large part, and because of this many patients are given phenobarbitone $\frac{1}{2}$ -gr three times a day.

They may be given an intra-gastric drip of whole or part milk, with a suitable alkali added, or they may be put onto an appropriate ulcer diet depending upon the severity of their symptoms.

The diets are very strict, food being taken usually every half to one hour. Care is taken that the diet contains sufficient calories, proteins, and vitamins. Alkalies may be combined with the diet, but it is reckoned that they do little good as it is impossible to keep the gastric juices neutralised by their use, for twenty four hours out of twenty four.

Any septic foci such as caries teeth are treated, and if the person has artificial teeth, but does not wear them, he is made to do so for eating purposes anyway. Other points such as smoking, which is allowed only after meals, and any anaemia present are treated.

The patient may after being kept in bed for about four weeks be allowed to return to work in about another four weeks. He is put on a post ulcer diet for at least two years and perhaps longer, with regular checkups.

All ulcers do not cured to a satisfactory extent, and thus Surgery now comes into the field. The following points are infavour or against surgical intervention.

- I. The age of the patient and his general fitness for an operation - the older the age of the patient the greater the surgical risk.
- II. The duration of the history of ulcer - the possibility of operating on acute ulcer must always be avoided.
- III. The prescence of organic pyloric stenosis with very persistent delay in emptying the stomach.
- IV. Failure to obtain cure after fully adequate prolonged medical treatment.
- V. Failure (willing or unwilling) on the part of the patient to carry out medical treatment, especially when the patient is the bread-winner.
- VI. The occurrence of any of the complications of an ulcer.
- VII. Risk of the onset of early carcinomatous change.

In the Surgical treatment we have various operations, which can be used. These vary from relieving the amount of food passing over the ulcer, namely a gastroenterostomy. Then we can remove the duodenal ulcer completely, and part of the stomach, or the whole of the stomach, and thus removing the acid producing area of the stomach. These operations being partial gastrectomy and total gastrectomy respectively.

In the past year or two a new type of operation has appeared. This is the operation of 'Vagotomy', where the vagus nerves are cut, and thus cutting of the vagal stimulation to the stomach.

I would like to describe the operation of partial gastrectomy now, as it was the operation of choice in this case.

There are varied opinions as to what operation should be done on a case of duodenal ulcer, but it would appear that the operation of partial gastrectomy is favoured by most people, though some do a total gastrectomy, while others say that a gastroenterostomy is enough. In the operation of partial gastrectomy you can remove the ulcer if possible, and part of the acid secreting area of the stomach. It is also an operation with a slightly lesser risk of death than that with a total gastrectomy, and is perhaps better in cases where the patient's health is not perfect, which in many cases is not very good by the time the patient reaches the surgeon.

There are various methods of doing a partial gastrectomy, and these have been given the name of the surgeon who first used this method. These methods are connected with the restoration of the digestive canal.


The incision is usually an upper right paramedian, and the abdomen is opened into and the contents examined. The pylorus and the first part of the duodenum are freed. Clamps are applied at the junction of the pylorus and the first part of the duodenum, and the part between the clamps cut. The duodenal stump is now closed and invaginated.

The stomach is now turned over to the left, and the lesser and greater omentum and blood vessels to the stomach, freed. Clamps are now placed across the stomach at the level decided upon and the stomach is cut across and the part removed. With this method the ulcer in the duodenum is left.

It is at this point we have the various methods.

Billroth's First Method.


Here the long incision across the fundus of the stomach is closed except for one inch at its lower end. Into this opening the duodenum is inserted and sutured.



The danger in this operation however lies in the fact with the duodenum being sutured direct into the stomach, we have a great risk of leakage. Satisfactory closure may also only be made with difficulty if there is only a little part of the stomach left and in order to bring the duodenum to it, we have to put it under tension, which is very bad.

Billroth's Second Method.


Here the stomach opening and the duodenal opening are both closed, and a new digestive canal made by means of a posterior gastro-enterostomy.



This operation may be done in two attempts, the gastro-enterostomy being done first. Thus if the patient is in a serious condition, this operation is a useful one.

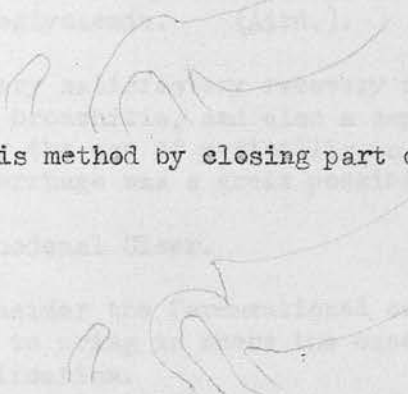
Kochers Method.

Here the stomach is completely closed, while the duodenal part is implanted into the lower part of the back of the remaining part of the stomach and sutured.




Polyas Method.

Here the duodenal stump is permanently closed, while a coil of jejunum as near the duodeno-jejunal flexure, is brought up into contact with the open end of the stomach. The jejunum may be brought up in two ways, the first in front of the transverse colon, and the second through an opening in the mesocolon.



Mayo has modified this method by closing part of the opening in the stomach.



In the operation carried out on the patient, the first part of the operation was as is usually done. The second part however differed. Here the duodenal stump was permanently closed with the ulcer tucked away inside. The first part of the jejunum was brought up in front of the transverse colon, though the other way is preferred, but here it could not be done due to the adhesions. Here part of the opening in the stomach outlet was closed, and the jejunum applied to the rest. Thus we had Polya's method of the operation, with Mayo's modification. However we have in addition an anastomosis between the loops of jejunum as well to aid the passage of bowel contents, and avoid stagnancy.

Complications of the Operation.

Certain complications may follow upon the operation itself. These are :-

1. Leakage from the duodenal stump. Peritonitis may follow this, and the outlook is grave when it occurs.
2. Leakage from the suture line. This very rarely occurs, but if it does death may quickly follow.

3. Post-Operative Vomiting. This is sometimes due to oedema of the stoma, and is prone to occur if the patient's serum proteins are low at the time of the operation.
4. Post-Operative Obstruction. This is usually due to kinking of the afferent loop by a clumsy anastomosis to twisting of that loop beyond the stoma, or to obstruction of the jejunum, at the stoma by too many layers of sutures.
5. Jejunal Ulceration. This is a late complication and may be due to enough stomach being left to produce a high gastric acidity.
6. Post-Operative Chest Complications. These vary from slight complications, e.g. bronchitis to severe pneumonia.
7. Haemorrhage. This may be from a suture line, or from the ulcer if it has not been removed.
8. Dumping Syndrome. There is a feeling of fullness after food with nausea, a feeling of general heat, sweating, and giddiness. It appears to be due to the too early passage of food into the small intestine, and the occurrence of a post-prandial hypoglycaemia. (Aird.).

The patient made a very satisfactory recovery from his operation. He however suffered from a mild bronchitis, and also a septic area around the drip. These were however cleared up by the use of penicillin, and fomentations respectively. The complication of haemorrhage was a great possibility in this case.

Complications of a Duodenal Ulcer.

We must consider the forementioned complications of a duodenal ulcer, and here we are able to bring in where the case main part of this case started, and its further complication.

The first one we must study is 'Perforation of the Ulcer'.

Perforation is more common in a duodenal ulcer than in a gastric ulcer. There are between nine thousand to ten thousand a year affected with perforation of both types of ulcer. The mortality rate of about a thousand is a heavy number because of it, though it is going down. It ranks second only to appendicitis among abdominal emergencies, but is more important. It is only during this the twentieth century that the number of cases has risen. About the turn of the century, women were mainly the ones affected, but now men are the ones seen.

A recent survey by Illingworth et al. 1944, shows that the cases of perforations appeared to decrease in the months of August, September, and October, and reduced to the days of the week, Sunday, and Monday were less common. (Practitioner). Another survey shows that they are uncommon during the night. The frequency of perforation increased towards the end of the morning, and drops in the early afternoon, and again increased notably towards the end of the afternoon. These changes were thought to be related to periods of rest, and fatigue. (Lancet).

The ages affected may vary from the early age of twelve (British Medical Journal July), to the late seventies and eighties.

The great majority of duodenal ulcers, which perforate are situated on the anterior wall, which is a common situation of such an ulcer. Ulcers on the posterior wall of the duodenum do not often perforate but usually adhere to the organs, which are situated posterior to it, the organ affected most being the pancreas.

The perforation may be divided into the :-

- I. Acute Perforation.
- II. Leaking Perforation.

The acute perforation is a spontaneous one, and because we have a hole in the wall of the bowel, which may vary from a centimetre to two to three centimetres, you get rapid emptying into the peritoneal cavity. This fluid is a highly irritant one and usually mildly infective though the duodenal fluid is more infective than the fluid from a perforated gastric ulcer.

Thus at first, at least, the peritoneal inflammation which occurs is a reaction to chemical irritation, and it is only after a lapse of a few hours that true bacterial peritonitis sets in. From this, the earlier that treatment is given the better the prognosis for the patient.

The passage of the fluid over the peritoneum has given rise to discussion, because at one time it was thought that it passed up to the liver, and down the right side of the vertebral column to the right iliac fossa, and then up to the left side of the abdomen. It is now stated (Mitchell) however that it passes from the Foramen of Winslow over the greater omentum to the right iliac fossa, and then up the posterior abdominal wall.

The second type i.e. the leaking or chronic perforation is occasionally seen, into a localised cavity, usually giving rise to a sub-phrenic abscess.

The history of a patient with an acute perforated ulcer usually includes the past history of a chronic ulcer, though in about fifteen per cent of cases, you get no history, and the presence of an ulcer is only found because of this abdominal catastrophe.

The patient may be at rest or working when he is seized by a very sudden, excruciating pain in the upper abdomen, but tends to spread down to the right iliac fossa, or may be generalised over the abdomen. Pain may be present in the shoulders due to sub-diaphragmatic irritation. This pain is aggravated by movement, and because of this fact, it was stated that the patient was always immobile, but this idea has changed lately, as quite a number of patients show marked restlessness. They may complain of nausea, and perhaps of vomiting, though not usually very much. On examination the patient is pale, and anxious, and shows that he is in great pain. He may look shocked, and have a greyish colour, and a moist skin. On the other hand depending upon the time of examination he may appear well. Respirations are usually increased, and sharp. The temperature is at first normal or a little under, as is the pulse, but later they rise, about six to eight hours later.

The abdomen shows marked immobility on respiration and appears flat. On palpation the abdomen is usually extremely rigid (board-like is a name given to it). It is tender all over but usually more marked in the upper abdomen. Rebound tenderness is present. On auscultation no intestinal sounds are heard. There may be a loss of liver dullness, and rectal examination may show some tenderness.

These symptoms and signs and history are usually enough to make a diagnosis of a perforation of some kind, but to help us too we may take a straight x-ray of the abdomen, which shows air under the diaphragm.

The course of the perforation changes however after about six hours, and after about eight to ten hours. The first stage is that of prostration or primary shock but after six hours the stage of reaction appears.

The patient's condition improves. The vomiting ceases and his pain becomes easier. Temperature and pulse become normal. The respiration is still shallow, and costal in type, and the alae nasi work slightly.

The abdominal wall is very rigid and tender, and great pain on movement of the body. The third stage becomes apparent after eight hours. Here the vomiting is more frequent, and he takes on a facies of late peritonitis. His abdomen is usually not quite so rigid, but is tender and distended. His pulse is rapid and small while his temperature is either slightly febrile or sub-normal. His respiration is laboured and rapid. This is the stage of frank peritonitis with toxic shock.

The initial symptoms of the perforation are due to the pain and shock consequent on the peritoneal cavity with the fluid from the perforation.

The recovery in the second stage is due to the attempt of the body to fight against it. The gastric juice etc., passed into the peritoneal cavity becomes neutralised and diluted. However this does not last long, and the body resistance is overcome again, and thus the pathology goes on more severe than ever, though though it did not cease in the second stage.

Having decided on the diagnosis it is now necessary to treat the patient. In this type of case the pre-operative treatment plays a large part in reducing the risk of death to the patient.

Treatment.

The patient is put to bed, and wrapped with warm blankets. A shock-cage may be applied but not allowed to over heat the patient. Morphine is given one half may be put into a vein, while the rest is given sub-cutaneously. The injection of Morphine is not favoured by everybody however, because of dangers that may arise. The patient may need intra-venous fluids, such as saline to replace the loss of fluids due to the perforation. It is to be hoped that a stomach tube has been passed by the General Practitioner, and the stomach emptied. If this is not done a stomach tube should be passed, and the stomach contents aspirated, and the tube left in situ so that the stomach can be emptied at intervals especially to avoid regurgitation into the throat and into the lungs, while receiving the anaesthetic.

The longer the operation is delayed the greater the risk is to life. If operation is performed within six hours the mortality is ten per cent, and with a twelve hours delay it is twenty per cent, whilst in later cases it rises as high as fifty per cent.

Patients with a perforated ulcer are very difficult people to anaesthetise. Probably owing to diaphragmatic irritation, they breathe badly, and easily become cyanosed, and are with difficulty got to a sufficient degree of relaxation. General anaesthesia is essential, gas, oxygen, ether is preferred by some people, administered by means of an endo-tracheal tube, and allows an easier administration. Some people have been using cyclopropane, but it is not liked by many surgeons, while one or two use curare to obtain abdominal relaxation, but as curare depresses the respiration of the patient, and due to the fluid in the peritoneal cavity the patient's respiration is not very good, and some surgeons refuse to use it.

After the skin area is prepared by cleansing, shaving, etc., a suitable antiseptic is put on the skin, e.g. Merthiolate, a mercurial antiseptic, rather pinky-orange in colour and shows your area of antiseptic, when the abdomen is opened. The incision is usually a right paramedian in the upper abdomen, with retraction of the rectus muscle laterally. Some people believe in a mid-line incision in the epigastric region as it gives access to the whole area. The posterior rectus sheath and peritoneum are opened, and you usually have an escape of gas, and find fluid varying in colour from watery colour but usually yellowish and bile-stained and usually on the right side and in the Pouch of Douglas.

The areas of possible perforation are examined, and in this case found on the anterior wall of the first part of the duodenum. The perforated ulcer shows marked induration around it. The perforation is closed if possible by an inner through and through catgut stitch, and an outer Lembert inverting layer of stitches. It should be noted that the suture line is transversely placed across the bowel, care being taken not to narrow its lumen. A tag of adjacent omentum may be stitched in place over the suture line as an extra safeguard. Free fluid in the peritoneal cavity should be removed by suction or swabs, special attention being paid to the pelvis, the sub-phrenic space, and the posterior recess in front of the right kidney.

Drainage is usually inadvisable in cases perforated less than eight hours, and thereafter is advisable only when the fluid is excessive or obviously contaminated. If a drain is inserted it should be a rubber tube, through a short mid-line suprapubic counter incision, and extends nearly to the pelvic floor. The drain is left in position for three to four days, being gradually withdrawn. The abdomen is closed in the normal manner.

Post-Operative.

The patient is propped up in bed usually the true Fowler position. The patient may be put on suction, which may be continuous, of the gastric juices, which if done, an intra-venous drip of saline is needed, while some people withdraw the juices at regular intervals.

The suction is stopped after two to three days. Chemotherapy such as penicillin is administered.

At first the patient receives only fluid, but after a few days, is gradually worked back to an ulcer diet. He is also got up after a few days, and some places this is done on the next day.

Great stress is now laid upon the patient doing breathing exercises, as a preventive against pulmonary complications.

Complications of an operation for perforation are common. These include pulmonary, especially massive collapse, and broncho-pneumonia, occur in a considerable proportion of cases. Paralytic ileus secondary to the wide-spread peritoneal contamination may develop during the first few days after the operation, and is best treated conservatively. Later when the peritoneal infection as a whole has subsided, residual abscesses may form, generally in the pelvis, or in the sub-phrenic space.

Other methods of treatment may be applied to the perforated ulcer. These are further types of operation, and also a conservative method of treatment.

The further types of operation are that you do an associated gastro-enterostomy with closure of the perforation. Here however you are increasing the risk of the operation, and is not regarded as essential as it is stated that about thirty per cent of cases treated by simple closure heal either because of the closure or the subsequent regime.

The other operation is that of Partial Gastrectomy. This however is a very major operation, and may be rapidly fatal to the patient. It is done because it removes the ulcer, and prevents further perforation, which often happens.

The conservative treatment is a way of treatment put forward because of the number of cases of perforation operated on which were noticed to have become localised.

The technique of treatment is that morphia is given intravenously and repeated as often as necessary to give complete relief from pain. A stomach wash-out is given with a large bore tube if a recent meal has been taken. After this intermittent suction half-hourly is done through a Ryles tube passed via the nose. No drinks are allowed for thirty-six hours, fluid intake being maintained by intravenous saline. Frequent mouth washes are given. Full chemotherapy is also given. This type of treatment seems to play a part for the late case of perforation where the damage has already been done, and a diffuse peritonitis is already present, and where the main indications are really immobilization, the replacement of fluids, and the administration of anti-bacterial drugs.

This conservative treatment may play a part in the leaking ulcer, because if left alone it may resolve completely. Sometimes an abscess may be formed, and drainage be required.

We must now discuss the present case with regard to what has already been said on the subject of perforation.

The patient tells us that his pain started at six o'clock in the evening. I remember seeing this case on his admission to hospital, and this was about nine o'clock, and thus we have an interval of only three hours. Thus we have a perfect case for operation, since we have him early. His symptoms were for the main part new, mainly of pain, which was generalised over the upper abdomen. For the week before admission he had had a fairly severe pain in the upper abdomen. This may have been a warning of the oncoming perforation, i.e. the advanced state of the ulcer, or that he had a slight leak, which was localised, but became acute suddenly, though is probably unlikely.

The examination of the patient fitted in well with the early stages of a perforation. He looked anxious, and was in obvious pain, his temperature was 98 F, just about normal, while the pulse and respiratory rate which were 88 beats per minute, and 24 per minute respectively were raised.

The abdomen moving very little on respiration, and very rigid, and tender were typical. His tongue was dry, showing fluid loss. No other important facts being elicited.

Thus we have the typical story and examination of a perforated viscus. His abdomen was duly opened, and a perforated ulcer found and closed. No drainage was done. Post-operatively he was treated as already mentioned, i.e. gastric suction, fluids, chemotherapy, and made excellent progress, and was discharged on a diet.

Thus here we have a case where the patient had a perforated ulcer six months previous to his present admission. He was also an early perforation, and this is the type of case it has been suggested that a partial gastrectomy or even a total gastrectomy carried out instead of just closing up the perforation. It is stated if a person has perforated twice he is very liable to perforate again or develop some other complications, which in actual fact this patient did do. However we must face the other side of the problem. The patient is shocked from the perforation, and the mortality rate is high enough without adding to it by doing a very major operation. It would thus appear better to let the patient recover from his perforation, and carry out drastic treatment later. A point in favour of this latter statement is in fact shown in the present case, where because of his previous perforation, his abdomen had a large number of adhesions, which would have added time and danger to any major operation at that time.

Another point in favour is that in thirty-eight per cent of cases the patient has symptomatic relief with simple closure. (British Medical Journal, Aug. 1946), and could thus do without the major operation. On another group of seventy patients attending a follow-up clinic, one hundred and thirty x-ray examinations of the stomach and duodenum were made. Evidence of a persistent or recurrent ulcer was found on forty-three occasions, and pyloric obstruction on only five occasions. i.e. forty-eight cases affected and twenty-two clear. (British Medical Journal, May, 1946).

This rather favours just a simple closure of the perforation, though on the other hand, we must think that if his symptoms do recur, he develops another perforation he may not be so fit to stand up to a much needed perhaps major operation. However another group, a large one, shows that remission of ulcer symptoms after perforating was seldom of long duration, forty per cent relapsing within a year, and seventy per cent within five years, and the incidence of major complications was twenty per cent. Thus the type of treatment for a perforation hangs in the balance.

We must now discuss a second complication of duodenal ulcer, and one which is also connected to the case, namely pyloric obstruction.

Stenosis of the pyloro-duodenal area is said to occur in about five per cent of cases of duodenal ulcer. The stenosis may be in the pyloric area and is called pyloric stenosis, while in the duodenum, it is called duodenal stenosis. The cause of the stenosis is said to be due to the fibrous tissue, which later contracts, in the complete or partial healing of an ulcer. It is thus aided when perforations, which may add to the increase of tissue. If the perforation is closed in a vertical manner, the lumen becomes narrowed. Another way of obstruction is that an active, juxta-pyloric ulcer is surrounded by oedema, and cause a spasm of the surrounding bowel, which may settle down after medical treatment, and thus avoid surgical treatment. In a case of slow stenosis the patient first develops a sensation of fullness in the epigastric region. The patient's appetite begins to deteriorate. Pain is not usually marked. Vomiting is a very characteristic symptom. At first the vomit is small, and occurs only very long intervals, often several days. However as the obstruction goes on the vomiting increases, and gives temporary relief. In the last stages the vomit has a sour smell, and separates into three layers, froth, fluid, and food. The food taken at a previous meal taken hours before, can often be recognised. Wasting of the patient may be apparent, the patient being dehydrated, and troubled with constipation. If the patient is untreated very serious signs occur. These are two in number:-

- I. Gastric Uraemia.
- II. Gastric Tetany.

Gastric uraemia is pre-renal, and is due to dehydration or alkalosis, and shows dizziness, thirst, nausea, and pain in the limbs. They later become nervous, drowsy, and convulsions may follow, and finally the patient becomes comatose if untreated. The blood-urea rises to one hundred to one hundred and fifty mgms. or higher. The chlorides are diminished, while the urine may contain albumin, and casts. Treatment for this condition is that of Alkalosis. Gastric tetany may develop from loss of chlorides in excessive lavage. When this occurs the mortality rate rises sharply. Operation on this type of case is very difficult, the greatest difficulty appearing to lie in the control of respiration. (Lancet, Aug. 1948).

The signs portrayed by a person with obstruction are dependant upon the degree of obstruction.

The epigastrium may show distension, and tender to the touch. Waves of peristalsis may be observed, usually on stimulation, if the obstruction is severe, and the stomach is full. The waves of peristalsis pass slowly from under the left costal margin, to the right, and above the umbilicus. Splashing if obtained many hours after a meal, points to obstruction, and retention of the meal in the stomach. Fractional test meal shows the resting juice to be of a large quantity, and may contain food. The free hydrochloric acid is variable. In the specimens you usually find that the free hydrochloric acid rises high, and may be sustained at this height. The total acid is definitely higher than the hydrochloric acid. Starch should persist throughout due to the slow emptying.

Radiographic examination, if carried out, shows the stomach to be practically normal in size, and shape in the early stages, while later the stomach appears bowl-shaped. There is usually evidence of peristalsis. The emptying time is prolonged, and may be several hours.

The treatment is by operation, though some people believe that medical treatment should be tried in case the obstruction is due to oedema and spasm.

The operation carried out is usually that of partial gastrectomy, with the removal of the ulcer. In older people however, a gastro-enterostomy is all that can be done, and is in all probability sufficient, with perhaps the new operation of 'Vagotomy'.

The main item about either operation, and more so in regard to that of partial gastrectomy is that of pre-operative treatment.

If all preliminary investigations are alright, then the patient may be brought in two to three days before the operation, which also goes to help the patient's morale. If the patient shows any signs of debilitation however, it is best to get him in about a week or two before hand in order to try, and build him up, and also give him a rest.

The patient is put to bed, though allowed up for toilet purposes.

A stomach tube is passed and the stomach emptied, and given lavage. This is said to be very important if the stomach shows signs of dilatation. Dehydration is combated by the giving of fluids, glucose, and saline, intra-venously. Vitamins deficiency is made up if wished, injection if needed of the suitable vitamins. It has been suggested that it would be of benefit to give protein by the intravenous route to assist in the Nitrogen Balance of the body. An oral protein hydrolysate has become very popular in America, but is still under trial in this country.

The social side is also regarded by many surgeons as a great help in building up the patient's resistance, and get the patient to mix with people, who have had the operation carried out on them, if possible.

Post-operative care has two points of view. The first is to allow the patient up the next day, just for a walk round the bed. This is regarded as a prophylaxis against post-operative complications, mainly pulmonary or paralysis of the bowel.

Breathing exercises are carried out daily. The diet is light up to the third or fourth day, but full diet, and allowed to eat anything, within moderation, is allowed soon after.

The other view taken, is that the patient should be kept in bed, at least for the first four to five days, and slowly allowed back to an ulcer diet.

We must now discuss the present case in regard to this complication, as this was the large part of the case.

The patient recovered very satisfactorily from his operation for closure of a perforated duodenal ulcer.

It was fully three months after his operation that he first was troubled with his stomach. He said that he had epigastric pain, and attacks of vomiting. However his vomiting had started to appear after every meal, suggesting marked irritation or obstruction, which relieved his discomfort, which is a typical symptom of obstruction. An interesting point was that the vomit contained the previous meal, which pointed to delay of emptying of the stomach. He found that though ordinary meals did not bother him after his perforation, they did now, because they were overloading the stomach. His sleep was naturally upset though his general condition was good, his weight being steady.

The examination of the patient did not show any distension of the epigastrium, but tenderness was present. Splashing was elicited, which is a sign of delayed emptying of the stomach.

After admission of the patient his pain became very marked, and it was eased by continuous intra-gastric drips of citrated milk, and petamide hydrochloride. These appeared to ease the pain. However it is interesting to note that after these his vomiting was not so often, but when they did occur were very large in volume. The vomit being dark brown in colour.

A barium meal was carried out on the twenty-third of April, and showed only an ulcer deformity of the duodenal cap, and an ulcerated base.

A fractional test meal showed a high residual juice, and a raised free hydrochloric acid and total acidity, which were both very high.

The patient was now prepared for operation. Slow intravenous saline was given before the operation.

The operation carried out was that of partial gastrectomy, which has already been described previously.

Certain peculiarities arose at the operation. When the abdomen was opened, it was found that the duodenal ulcer was about to perforate, and actually did perforate while being examined. Due to the adhesions from the two previous operations for closure of perforations, it was thought inadvisable, and too difficult to remove the part of the duodenum affected, and the operation was carried out through the pylorus. It was said at the time how big the stomach was, and that a large part could be safely removed, and by doing so remove the acid area.

The other point in regard to the operation is that the jejunum had to be brought anterior to the colon, which is not liked.

The patient did not develop any of the severe complications of such an operation, and made a very successful recovery.

This patient showed several points which I think rather disagrees with the diagnosis of Cicatricial Pyloric Stenosis.

The symptoms and the signs of obstruction, and the knowledge that he had had two previous perforations, do point to this diagnosis. However from what was found at operation that the ulcer was about to perforate again, suggests that a large part of the obstruction was due to oedema and spasm.

Obstruction due to oedema and spasm is usually cured by medical treatment, but in regards this case, it was just as well that the operation was carried out when it was, because he would have perforated later, and increased his trouble.

Haematemesis and Melaena are relatively common complications as shown by a series of massive gastro-duodenal bleedings treated at St. James Hospital, London, from 1941-1948,, one hundred and ninety five cases out of six hundred and fifty were due to duodenal ulcer.

Haematemesis or melaena when they occur may be in a small way or as a severe haemorrhage. It must not be thought however that these only occur only with a duodenal ulcer, because they occur in gastric ulcer, carcinoma of the stomach, gastritis, and portal hypertension, etc..

If the patient gives a history of a previous ulcer, it is reasonably safe to assume that it is due to the ulcer.

The ulcer erodes through the blood vessels which may be arteries, veins or capillaries

It is worse when a posterior duodenal ulcer is the cause of the erosion, as it may erode the duodenal artery. If the haemorrhage is small, it is usually safe to treat medically, but if large, it must be treated by surgery, after the replacement of the lost blood by transfusion.

It is recommended that the operation of choice is a partial gastrectomy, with removal of the ulcer. One or two surgeons think that if the bleeding vessel can be tied that it is quite sufficient.

In a series of cases being carried out in America, they state that operation should be carried out within twenty four hours after admission, after a severe haemorrhage where on admission the red blood count is down to two point five million, and that reasonably good evidence is present for the diagnosis of peptic ulcer.

The advantages of early i.e. within twenty four hours, operation for haemorrhage appear to stand out.

These are:-

- I. Haemorrhage is controlled directly.
- II. Mortality rate is lowered.
- III. Definitive treatment is provided for the peptic ulcer diathesis.
- IV. Early resuscitation and relief of anoxia is achieved.
- V. Diagnosis is established in doubtful cases.

VI. Pyloric obstruction when present is relieved.

VII. Less blood is required in many cases.

They however do not recommend surgical treatment, but more to medical unless you have the following:-

I. Expert twenty four hour laboratory service.

II. Adequate blood bank.

III. Skilful anaesthesiologic service.

IV. Expert surgical judgement and technique.

V. Expert resident and nursing care.

(American Annals Of Surgery).

Often however partial gastrectomy does not stop the haemorrhage, and then direct ligation of the vessel must be taken, usually the gastro-duodenal artery, though the inferior or the superior pancreato-duodenal arteries must be thought of too. Thus for very mild haemorrhage, treat medically, but watch carefully, and be ready for surgical interference, while severe haemorrhage, treat surgical at once.

Carcinomatous change of a duodenal ulcer is said never to occur, even though the duodenum is regarded as the commonest part of the small intestine for tumour growth, and usually occurs in the neighbourhood of the Ampulla of Vater.

Adhesions which occur after operations may lead to obstruction of the bowel, if pressing across it. Intestinal hernia may occur among the adhesions, and thus with intra-abdominal complaints occurring after operations, adhesions must be thought of as a cause.

We must now discuss a new and different form of treatment for a duodenal ulcer, namely 'Vagotomy'.

Vagotomy has only come into its own in the past few years. The operation was envisaged by Sir Benjamin Brodie in 1814, and the operation was practised successfully as far back as twenty years ago.

It has been known that the action of the vagus nerve was secretory and motor, i.e. on stimulation it produced secretion of the gastric juice, and also motility of the stomach. Because it has been noticed that high gastric acidity was an accompaniment of an ulcer, it was thought that by cutting the vagus nerve the secretion of hydrochloric acid would be more or less completely cut out, except for the secretion caused by hormonal action, though some people think that it is controlled by the vagus too.

It was thus decided to proceed further into the work by carrying out the operation of 'Vagotomy'.

There are two ways of cutting the vagus nerves, the first is transpleural, through the eighth and ninth intercostal spaces. This operation was first carried out by Dragstedt. It has certain disadvantages, one of which is that you never see the actual lesion in the abdomen, and often marked pain in the chest follows the operation.

The other route is the transabdominal. This is Wertheimer's operation, but has been modified by Orr. This type of operation is said to be liked because the lesion can also be inspected.

Moore however states that doing it this way, you do not cut all the nerves, and Walter's and his colleagues found that in some people the vagi had no consistent course, and the oesophageal plexus failed to form common trunks. Perhaps this might explain certain cases where the success has not been complete after vagotomy.

The operation is not carried out without complications, and side effects however. These vary from persistent ulcer pain, and some have had bleeding. Distension is common, with eructation of a foul-smelling gas, but these are transient. Diarrhoea and slight obstruction due to the upset in the gastro-colic reflex may occur, but clear up in a few months usually. Most patients show a six hour barium residue after the operation, and occasionally delay in emptying the stomach, necessitates the performance of a gastro-enterostomy. The full effect of vagotomy does not come into being for about three months.

Many people have thought that the operation of vagotomy carried very little risk to life. Cases of death have however been recorded. Week and others had a case of sudden death when the nerves were gripped prior to section. Grimson has reported of a death of rupture of the stomach, and several cases have been reported of patients dying from a painless perforation months after the operation. Certain tests have become associated with this operation, namely, Night Secretion Test, and the Insulin Test Meal.

The night secretion test is done with the patient fasting from six p.m., and a Ryles tube is passed at nine p.m., and the stomach contents are aspirated, and discarded, and then the contents are taken off at hourly intervals till nine a.m. The total fluid is noted, and the free acidity estimated. A total volume under one hundred cubic centimetres, and/or free acidity under twenty cubic centimetres N/10 NaOH is against a diagnosis of vagotonia. A true vagotonia secretes four hundred to five hundred cubic centimetres in twelve hours, with free acidity of fifty to eighty cubic centimetres of N/10 NaOH.

The insulin test meal is connected with the fractional test meal. This test meal is done in the usual manner, and then sixteen units of insulin of the soluble type is given intravenously, and the total gastric secretion is aspirated every twenty minutes thereafter for an hour. Check estimations of the blood sugar as to the effect of the insulin on the secretion is lost if the blood sugar fails to fall to fifty mgms per one hundred cubic centimetres. In the presence of hypoglycaemia stimuli are conveyed from the hypothalamus to the stomach by way of the vagi, even in normal people, but in vagotonic persons the response is very marked. The test meal curve takes a sharp rise attaining at the end of an hour, free acidity of over one hundred cubic centimetres N/10 NaOH. This test is of most value as indication as to whether vagotomy has been complete.

From a number of report issued on cases of vagotomy, it appears that it is indicated in cases of recurring ulceration after partial gastrectomy. Excellent results in treatment of gastro-jejunal ulcers which have followed gastro-enterostomy have also been obtained.

When duodenal ulcer is treated by vagotomy, results obtained seem to be little better than when a gastro-enterostomy has been done. (Practitioner). Here however vagotomy would remove the possibility of a jejunal ulcer, which would be likely to occur with gastro-enetrostomy.

Dr. W.A.Allen states that early results equalled partial gastrectomy in that eighty-five to eighty-six per cent of cases subjected to either procedure were cured of their symptoms. However against these results must be borne in the mind that there is a great difference in the mortality figures, that of partial gastrectomy being considerably higher than those for vagotomy.

Conclusion.

We may now perhaps put forward certain conclusions on this case of duodenal ulcer. The cause i.e. the aetiology, of this case is as difficult to make out as is the aetiology of any case of duodenal ulceration.

He was a man who worried, and gave you the impression of his worries from his appearance. From examination of the patient, we find a high acidity, thus showing another of the factors that may be needed for ulceration to arise.

From knowledge of the patient and the later knowledge of his operation result, there is difficulty however in showing the origin of the ulcer in the area that it occurred. His course from the first perforation with the second perforation is definitely marked by his amount of worry, especially with the loss of his wife.

The patient had the two perforations which were closed, and later developed signs and symptoms which required a partial removal of his stomach. It is at this point that we may be allowed to think of the idea that in a person who develops a second perforation such as this patient did, it would be better to have a partial gastrectomy if suitable instead of a simple closure of the perforation.

From evidence already stated it is very likely that a patient with one perforation to his credit is likely to develop another, and also the dangers that go with it.

In regard to this case, a partial gastrectomy done with the first perforation, or with the second, would have prevented the downgrading of the health of the patient. As it turned out at operation, the patient had a very active ulcer, which was about to perforate, and I think that his symptoms of pyloric stenosis, were not wholly cicatricial as diagnosed before the operation, but due to the oedema and spasm caused by the ulcer.

There was also the delay in having to carry out the specific tests necessary, and a point which stood out at the operation, the difficulty in carrying out a satisfactory removal of the part of his stomach, with proper connection of the digestive canal again due to the many adhesions present.

These adhesions arose from the previous operations, and thus if the partial gastrectomy had been done earlier on, an easier and safer operation could be done. As it was the duodenal ulcer, which did in fact perforate for a third time at the commencement of the operation, had to be turned in, i.e. invaginated, into the duodenal stump, while the ulcer was very active, because the duodenum was bound down to such an extent with adhesions.

The subject of 'Vagotomy' in a case like this is doubtful, and perhaps useless in the stage the patient reached, as satisfactory removal of the acid bearing area is removed by the operation.

However it perhaps could have been used after the first perforation if the patient has a high acidity, as it might then allow the ulcer to heal. It would probably be advisable to do a gastro-enterostomy in the case of a duodenal ulcer.

It would appear from the patient's progress after the operation up to the present time that his improvement is very marked. His ulcer appears to have settled down, while his digestion is very good.

The success of the operation, however, I think is largely due to the absence of worry on the part of the patient after his operation.

CASE. NO. III.

A CASE OF HAEMATURIA.

ITS COURSE AND TREATMENT.



Name. David Dawson.

Age. 36 years.

Occupation. Clerk.

Address . 9, Balgonie Place, Markinch, Fife.

Doctor. Dr. Gordon, Balgonie Place, Markinch, Fife.

Admitted. 25th. October, 1946.

Discharged. 8th. November, 1946.

Complaint. Passage of blood in the urine.

History.

Present.

The patient states that he was perfectly well till two months ago, when he got up one night to pass water, and found himself unable to carry out the act of micturition. This state continued until midday, the next day, when he managed to pass water, with the passage of a large amount of red blood as well. During the day he had fairly severe hypogastric pain, and passed a few clots of blood per urethrae. After this he suffered from frequency of micturition, and the next day vomited once, after which he was admitted to Ward 29. of the Royal Infirmary, Edinburgh. The haematuria cleared up two days after admission, completely. He always had headaches in attacks. He was discharged from Ward 29, and returned as an out-patient to the Diagnostic Theatre, for examination purposes. There has been no further haematuria, or other urinary symptoms. His appetite is quite good, and he thinks that he has lost only a little weight, if any at all. His bowel actions are quite regular. He has no breathlessness, or cough. There has been no attacks of pain in the back etc., of recent origin.

Past.

Nil.

Social Conditions.

Food and Habits.

He states that he lives in good surroundings, and is well fed. He smokes a few cigarettes daily. He drinks occasionally.

Family.

Nil.

State on Examination.

Intelligence.	Very Good.
Development.	Very Good.
Muscularity.	Very Good.
Nutrition.	Very Good.

General Appearances.

He is a medium sized man, of the heavy built type. This heaviness is however partly fat. He looks young for his age. He is sitting comfortably in bed, and is very cheerful, and co-operative. He is of a good colour. The left side of the face shows asymetry. The left shoulder appearing higher than the right.

Temperature.

This was 97 degrees F. on admission.

Pulse.

This was 68 per minute on admission.

Respiratory Rate.

This was 20 per minute on admission.

Blood Pressure.

Systolic Pressure.	145 mms. Hg.
Diastolic Pressure.	95 mms. Hg.

EXAMINATION OF SYSTEMS.

Urinary system.

Micturition.

The patient found himself unable to pass water one night. When he did manage to do so the next day, the passage of dark red urine was noticed. He suffered pain in the hypogastric region, and did so till he passed several clots, the appearance of which he did not remember. He had no pain on passing the urine, or any pain in the region of the kidneys, or along the ureters.

Palpation.

The kidneys were not palpable, and no tenderness was found.

Urine. When examined there was no haematuria present.

Spec. Grav.	React.	Colour.	Alb.	Sugar.	Acet.
1018.	Acid.	Lemon.	-	-	-

Microscopic.

Debris was prominent. One or two red blood cells could be made out.

Special examinations were carried out and will be reported later.

Circulatory System.

Dyspnoea. He has no breathlessness at all.

Palpitations. None.

Pain. None.

Faintness. None.

Headaches. He was troubled with headaches during the attacks.

Arteries.

Pulse. On admission it was 68 per minute.

Rhythm. Average.

Force. Medium.

Systolic. Above Average.

Diastolic. Above Average.

Nature of the vessel wall. Not palpable.

Nature of the pulse wave. Regular.

Blood Pressure.

By use of the Sphygmomanometer:-

Systolic Pressure. 145 mms. Hg.

Diastolic Pressure. 95 mms. Hg.

Veins. No abnormality.

Capillaries.

There is no cyanosis, or dropsy.

Heart.

Form of the Praecordium.

No abnormalities.

Pulsations.

None either in the Epigastrium, upper part of the Sternum, or in the Neck.

Palpation.

The apex beat lies within the 5th. intercostal space, on the mid-clavicular line. There are no thrills present.

Percussion.

On percussion the heart showed no enlargement.

Auscultation.

Mitral. All the heart sounds
Tricuspid. are easily heard, and
Aortic. are quite normal. There
Pulmonary. are no murmurs.

Rate of the heart.

Average.

Rhythm.

Regular.

The Pulse is present.

Respiratory System.

Cough. No cough at all.

Expectoration. None present.

Haemoptysis. None.

Breathlessness. None.

Pain. None.

Signs.

Breathing.

Rate. This was 20 per minute on admission.

Type. Abdominal-Thoracic.

Rhythm. Regular.

Sputum. None.

Thorax.

Inspection. The chest is covered with a thick layer of fat. It is very large. There is a marked tendency to it being round. There are no local or general departures from normal.

Palpation.

Movements are equal on both sides, and are of a good expansion. Vocal Fremitus is equal on both sides.

Percussion.

The note was resonant, and equal in all areas, and on both sides.

Auscultation.

Breathsounds. Vesicular.

Accompaniments. Nil.

Vocal Resonance. Equal on both sides.

Haemopoietic System.

No glands are palpable.

Spleen. It is not enlarged.

Haemoglobin. 81%.

Locomotory System.

Bones. There was no pain or tenderness present in
Muscles. any part. It was observed that there was present
Joints. a left sided " torticollis ". The patient stated
that he had had it as long as he could remember.

Endocrine System.

Pancreas. Nothing abnormal. Urine- Sugar. free.

Thyroid. It is of average size, and consistence. There
are no pulsations present. No symptoms of an
abnormal Thyroid present.

Parathyroid.

There is no Tetany present, and no signs of
changes in the bones.

Suprarenals.

No symptoms or signs connected with the
Suprarenals.

Pituitary. No abnormalities present.

Integumentary System.

No abnormality discovered.

Reproductive System.

No abnormality discovered.

Alimentary System.

Appetite. His appetite has been quite good.

Thirst. He does not drink any more than usual.

Dysphagia. He has no difficulty in swallowing.

Pain. He complained of hypogastric pain on the day following his difficulty in micturition.

Feeling of weight. None.

Distension. None.

Flatulence. None.

Heartburn, Waterbrash, Nausea. None.

Vomiting. He was sick once on the second day.

Action of the Bowels. These are regular.

Weight. He thinks that he may have lost a little.

Signs.

Lips. These are red in colour, and are moist.

Tongue. It is rough, and clean and moist.

Teeth. They are his own, and are in a good state.

Abdomen. General.

The abdomen is well covered with a thick layer of fat. There are no abnormalities on inspection. The movements on respiration are equal.

Palpation.

There is no rigidity or tenderness of the abdomen. No mass can be palpated. The liver is not enlarged.

Percussion. Nil.

Auscultation.

Normal Abdominal sounds heard.

Rectal Examination.

Negative.

Eye Examination.

Fundus Oculi. Negative.

Nervous System.

Mental Function.

Very Good. There are no abnormalities.

Cranial Nerves.

No abnormality.

Reflexes.

Superficial.

Abdominal. Present.
Plantor. Present. Flexor.

Deep.

Knee. Present on both sides,
and equal.
Ankle. Present on both sides,
and equal.

Special Examination.

Cystoscopic Examination.

Mr. T.I. Wilson.

19th. September, 1946.

Urological Report.

A 2IF. Cystoscope was passed. Clera urine was withdrawn. The bladder was filled and a capacity of three hundred cubic centimetres obtained. On veiwing the interior, the bladder appearances are normal in all areas except for a slight injection of the trigone, and internal meatus. Both ureteric orifices are normal in all respects. Both ureters catheterised, to 30 cms. on the right side, and to 28 cms. on the left side. Clear secretion was obtained from both sides. Pyelograms. - 9ccs. right side, distension, pain, and brisk return. 7ccs. left sidē, no pain, and normal return.

X-ray report.

42309. Pelvic floor shows catheters in situ, passing normally upwards. No abnormal shadows are noted.
42310. Renal regions. Catheters in situ, passing normally upwards to end at the level of the transvers process of Lumbar two. Both renal outlines are normal in situation. The left renal outline would appear to be somewhat enlarged downwards. Four rounded shadows irregular in contour, and density are seen/



X-ray Report. 19th. September, 1946.

Pyelogram-right. It is normal in all respects.

Pyelogram-left. This shows some angulation at the pelvo-ureteral junction. The pyelogram indicates that the kidney is somewhat low in position. The middle and lower calyces are normal. The upper major calyx system is however, attenuated, and stretched in its supero-medial portion. The upper major calyx system on the left side is suggestive of a lesion at the upper pole of the kidney.

/seen at the level of Lumbar four, on the right side, one of them overlying the catheter.

423II. Pyelograms, right and left.

Pyelogram-right. It is normal in all respects.

Pyelogram-left. This shows some angulation at the pelvo-ureteral junction. The pyelogram indicates that the kidney is somewhat low in position. The middle and lower calyces are normal. The upper major calyx system is however, attenuated, and stretched in its supero-medial portion. The shadow previously noted bears an altered relationship to the right catheter.

Bacteriological Report.

Bladder Urine. No cells, organisms, or growth.

Right and left kidneys.

A few epithelial cells, no organisms or growth.

Conclusion.

While there is no definite cystoscopic or pyelographic appearance indicative of the source of the bleeding, the upper major calyx system on the left side is suggestive of a lesion at the upper pole of the kidney.

Re-examination is necessary to confirm.

Continuation Report.

3rd. October, 1946.

Mr. T.I. Wilson.

A 2IF. cystoscope was passed. Clear urine was withdrawn. The bladder was filled and a capacity of 300 cubic centimetres plus was obtained.

The bladder appearances were identical with those noted on the former occasion. The left ureter was catheterised with ease to 30 cms. Clear secretion was obtained.

Pyelogram. left. - 7ccs. without discomfort, and a normal return.

X-ray report.

42340. Renal regions. The left catheter passes normally to the level of the lower border of Lumbar two. The left renal outline is elongated, and enlarged at the upper end.

42341. Pyelogram-left. The middle and lower calyces and pelvis are normal. The pelvo-ureteral junction shows angulation as before at the level of the transverse process of Lumbar two, being flattened from above downwards. The upper minor calyces are attenuated and flattened from the top. The upper margins of this shadow correspond with a portion of the circumference of a rounded mass seen occupying the upper pole of the kidney.

Bacteriological Report.

Bladder Urine. No cells, organisms, or growth.

Conclusion. The conclusion reached was that of a
Left Renal Tumour.

From the history and the examinations made and the report
from the Urological examination, it was decided to carry out a
left sided Nephrectomy.

Non-operative Treatment.

Nil.

Operation.

Premedication.

Omnopon. gr I/3.

Atropine. gr I/100.

By subcutaneous injection.

Operation.

29th. October, 1946.

Surgeon. Mr.R. L. Stewart.

Anaesthetic. Gas, Oxygen, Ether.

Nature of the Operation. ' Left Nephrectomy '.

With the patient lying in the kidney position, the abdomen was opened through a left nephrectomy incision, dividing the muscles. The Lumbar fascia was opened , and the peritoneum was reflected forwards. The kidney was identified with the tumour lying at the upper pole. The perinephric tissues were cleared from the kidney, and the vessels and ureter identified. The artery and vein were ligated doubly, and divided. The ureter was then ligated, and divided and the kidney removed. The wound was then closed in layers with catgut, and silkworm gut around a posterior rubber drain.

Progress after the Operation.

2nd. November, 1946.

The patient recovered well from the operation. He was secreting urine well. He had no pain and no discharge from the wound. He looked and felt well. He was taking his food satisfactorily.

8th. November, 1946.

The patient was progressing very well. His stitches were still in. The wound was healing well. He was discharged to Beechmount convalescent home.

22nd. November, 1946.

He was reporting back from the home. He had had an uneventful recovery. The wound had healed well, and was quite sound. He had been up and walking. He was allowed to go to his own home.

26th. April, 1947.

He was reporting back. He was feeling perfectly well. The scar had quite firmly healed. There was some slight diffuse bulging at the medial end of the wound.

28th. May, 1947.

He reported back complaining of pain in his left shoulder region, and down his arm. It was observed again that he had Cervical scoliosis, and a congenital high scapula. On examination, tenderness was obtained about the level of the Surgical Neck of the left Humerus. No actual thickening of the bone could be palpated. He was sent for X-ray of the region.

X-ray Report. 29th. May, 1947.

Left Shoulder.

There is an osteolytic lesion involving the upper part of the shaft of the Humerus, with some extension into the soft tissues on the inner aspect, and reactional bone changes. The appearances are those of secondary neoplasm and are typical of a secondary from a renal tumour.

4th. June, 1947.

He was sent for X-ray of the Chest, Skull, and Pelvis.



X-ray Report. 4th. June, 1947.
Left Shoulder.

There is an osteolytic lesion involving the upper part of the shaft of the Humerus. There is some extension into the soft tissues on the inner aspect, and reactional bone changes.

X-ray Report. 4th. June, 1947.

Shoulders, Chest, Pelvis, Left Arm, And Left Forearm, and Skull.

Further films confirm the prescence of a secondary neoplasm in the upper part of the left Humerus as previously reported. The only other abnormality noted is some doubtful osteolytic areas showing in a lateral view of the Skull, the significance of which is uncertain, and further stereo films of the skull are advised.

2nd. July, 1947.

The patient reported back and stated that the pain was still present in his left arm. He was sent for X-ray of the skull as requested by the X-ray dept.

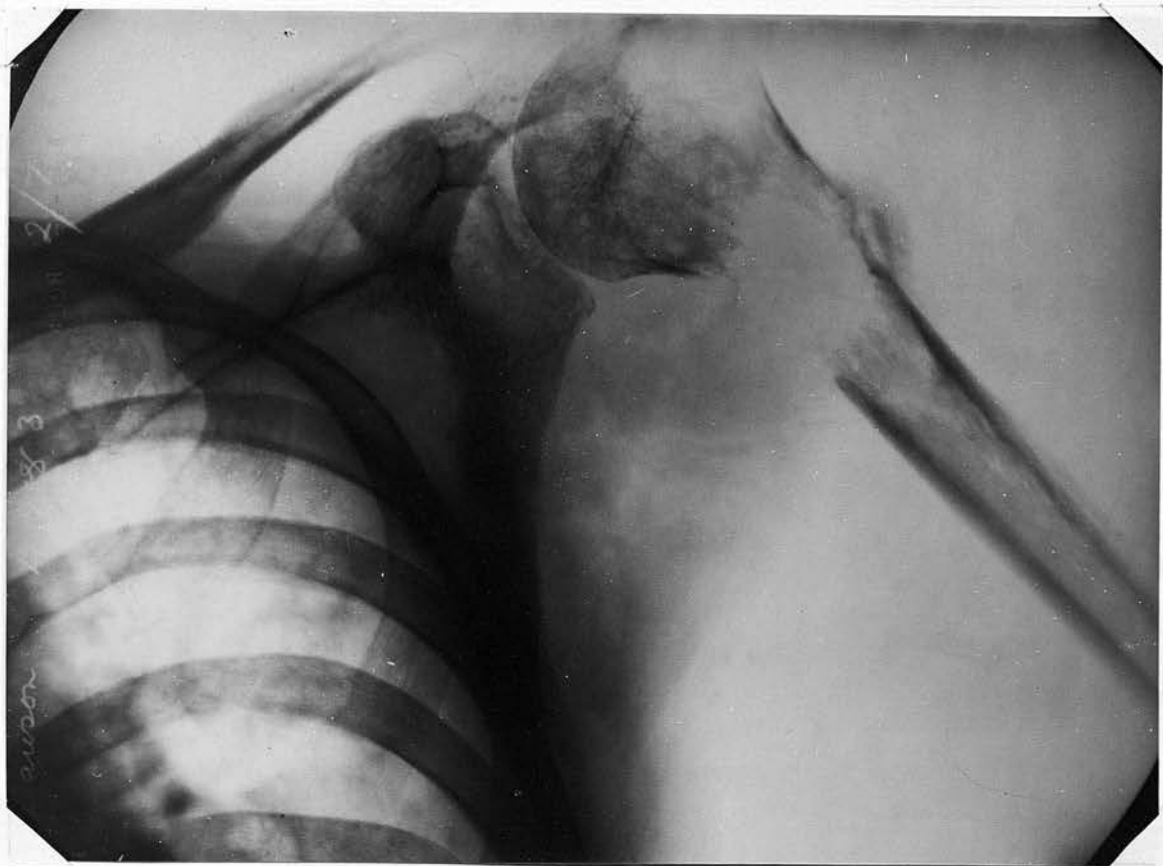
X-ray Report. 2nd. July, 1947.

Skull. There is no evidence of secondary neoplasm.

Left shoulder.

The tumour in the upper end of the Humerus has increased considerably in size since the last examination with exstension into the soft tissues on the inner aspect, and further callus formation on the outer aspect.

Because of the state of the patient and the results of examination, and X-ray examination, the patient was re-admitted to the ward on the 6th. July, 1947, for further treatment.



X-ray Report. 2nd. July, 1947.

Left Shoulder.

The tumour in the upper end of the Humerus has increased considerably in size since the last examination with extension into the soft tissues on the inner aspect, and further callus formation on the outer aspect.

Pathological Report.

Received. 29th. October, 1946.

Issued. 9th. November, 1946.

Nature of Specimen. ' Kidney '.

Macroscopic.

The kidney is slightly enlarged through the prescence in its upper pole, protruding as a lobular mass, of a tumour five to seven centimetres in its diameter, well demarcated from the adjoining kidney tissue. The tumour is composed of a rather opaque yellowish white tissue with large areas of necrosis, softening, and haemorrhage. There is no sign of extension of the tumour tissue into the veins.

Microscopic.

The tumour shows the typical picture of a ' Hypernephroma, renal adenocarcinoma, consisting of a large, hydropic, foamy, mass of cells, mainly arranged in solid alveoli, but here and there forming tubules, with a scanty delicate supporting stroma; and extensive necrosis. Mitoses are rare, there is no sign of venous invasion, and the tumour is sharply demarcated from the adjoining kidney tissue, and suggesting a low grade of malignancy.

Part. II.

Readmission.

Name. David Dawson.

Age. 37 years.

Occupation. Clerk.

Address. 9, Balgonie Place, Markinch, Fife.

Doctor. Dr. Gordon, Balgonie Place, Markinch, Fife.

Re-admitted. 6th. July, 1947.

Complaint. Pain in the left shoulder region.

History.

Present.

The patient states that about nine months ago he underwent an operation for the removal of his left kidney, because of tumour growth. He was perfectly well up till two months ago, when he began to notice an aching pain in his left shoulder region, which radiated down to his hand at times. At the start the pain only came on when he moved the limb. Since that time however, the pain has become more constant, and wakens him at night. He is now unable to move the shoulder joint very much owing to severe pain experienced in attempting to do so. He has no headaches, or sweating. He is not troubled with breathlessness, or has he had a cough. His appetite is not so good. He thinks his weight has gone down recently. His bowel actions are regular, and he has remained free from urinary symptoms since his last operation.

Past. Operation for removal of left kidney -29th. October, 1946.

General Appearance.

The patient was forced to sit upright in bed. His left arm was supported in a sling in order to ease the pain which he felt when it was hanging down. He looked tired, but was still cheerful.

EXAMINATION OF SYSTEMS.

ocomotory System.

Examination of the left shoulder region showed:-

1. Cervical Scoliosis.
2. Congenital High Scapula.
3. Torticollis.

On examination of the left Humerus, a small swelling could just be made out a little below the shoulder joint. It was irregular in outline and appeared diffuse. Palpation.

Some thickening of the bone could be made out on the left Humerus, a little below the neck of the Humerus. It was tender to the touch. No other swelling could be made out in any other part of the bone.

Joints.

The shoulder joint did not show signs of swelling or effusion, though it could not be freely moved due to the severe pain which it caused to the patient.

Nothing abnormal was discovered in the other joints.

Muscles.

These showed no change, irritability, hypertrophy, or atrophy.

irculatory System.

Dyspnoea. None.

Palpitations. None.

Pain. None.

Faintness. None.

Arteries.

Pulse. This was 90 per minute on admission.

Rhythm. Steady.

Nature of the vessel wall. Not palpable.

Nature of the pulse wave. Regular.

Blood Pressure.

By use of Sphygmomanometer:-

Systolic Pressure. 149 mm. Hg.

Diastolic Pressure. 91 mm. Hg.

Veins. Nothing abnormal.

Capillaries.

There is no cyanosis or dropsy present.

Heart.

Form of the Praecordium.

Nothing abnormal.

Pulsations.

None either in the Epigastric region, upper part of the Sternum, or in the Neck.

Palpation.

The apex beat lies within the 5th. intercostal space, on the mid-clavicular line. There are no thrills present.

Percussion.

The heart shows no signs of enlargement on percussion.

Auscultation.

Mitral.	The heart sounds are easily
Tricuspid.	heard and are quite normal.
Aortic.	There are no murmurs
Pulmonary.	present.

Rate of the Heart.

Fast.

Rhythm.

Regular.

The Pulse is present.

Respiratory System.

Cough. None.

Expectoration. None.

Haemoptysis. None.

Pain. None.

Signs.

Breathing.

Rate. This was 20 per minute on admission.

Type. Abdominal-Thoracic.

Rhythm. Regular.

Sputum. None.

Thorax.

Inspection. There are no local or general departures from the normal. Movements are equal on both sides.

Palpation. Movements are equal on both sides. Vocal Fremitus equal on both sides.

Percussion. The note was normal and equal in all areas.

Auscultation.

Breathsounds. Vesicular.

Accompaniments. Nil.

Vocal Resonance. Equal on both sides.

Urinary System.

There was no pain present in any part.

Micturition.

There was no difficulty or pain during micturition.

Kidney. The right kidney was not palpable.

Urine.	Spec Grav.	React.	Colour.	Alb.	Sugar.	Acet.
	1019.	Acid.	Yellow.	-	-	-

Microscopic. Nil.

Alimentary System.

Appetite. His appetite has become poor during the past few months.

Thirst . He does not drink more than usual.

Dysphagia. None.

Pain. None.

Feeling of weight. None.

Distension. None.

Flatulence. None.

Heartburn, Waterbrash, and Nausea.
Nil.

Action of the Bowels. Regular, every day.

Signs.

Lips, These are red and moist.

Tongue. It is rough and red and quite moist.

Teeth. They are his own.

Abdomen. General.

It is a well covered abdomen. It moves well on respiration. His old operation scar is seen.

Palpation.

There is no rigidity or tenderness. No mass can be felt. The liver is not enlarged.

Per cussion. Normal.

Auscultation. Normal abdominal sounds are heard.

Rectal Examination. Negative.

Haemopoietic System.

No enlarged lymph are palpable.

Spleen. It is not enlarged.

Haemoglobin. 89%.

Endocrine System.

Pancreas. Nothing abnormal. Urine - Sugar free.

Thyroid. It is of normal size and consistence. There are no signs of an abnormal Thyroid.

Parathyroids. There is no Tetany present, and no signs of changes in the bones due to this.

Supra renals. Nothing abnormal.

Pituitary. Nothing abnormal.

Gonads. Nothing abnormal.

Reproductive System. Nothing abnormal.

Nervous System.

Mental Function.

Good. There are no abnormalities.

Cranial Nerves,

All normal.

Reflexes.

Superficial.

Abdominal. Present.

Plantor. Present. Plantor.

Deep.

Knee. Present and equal on both sides.

Ankle. Present and equal on both sides.

Integumentary System. Nothing Abnormal.

The results of the X-ray examinations carried out on the patient have been reported on in the progress notes of the patient after his first operation.

From the history and examination and X-ray reports, the diagnosis of a secondary growth in the upper part of the left Humerus, from the primary growth in the kidney, which was removed at the previous operation. It was decided to remove the whole of the patient's left arm and the shoulder girdle as well.

Non-operative Treatment.

Operation.

Premedication.

Omnopon. gr. I/3.

Atropine. gr. I/100.

By subcutaneous injection.

Operation.

IIth. July, 1947.

Surgeon. Mr. R. L. Stewart.

Anaesthetic. Pentothal, Gas, Oxygen,
little Ether.

Nature of the Operation. ' Interscapulo-thoracic Amputation.'

An anterior incision was made along the upper border of the clavicle, and continued obliquely outwards, and downwards across the anterior axillary fold, and then obliquely across the axilla. The middle third of the clavicle was then sawn through, and removed. The subclavian vessels were exposed and after double ligation with silk ligatures, divided across, the artery being divided first. Ten per cent. Planocain was injected into the trunks of the brachial plexus, and divided after ligatures had been placed round the stumps. The posterior scapular, and transverse scapular arteries were then identified, and divided.

The Pectorales major and minor were then divided.

With the patient lying in the semi-lateral position, the incision was then completed posteriorly, and the axilla cleared after division of the nerves. The scapular muscles were then divided, and the wound closed after haemostasis had been assured.

Interrupted silkworm gut was used for the skin. The skin flaps being brought together without tension.

A rubber tube drain was inserted through a separate stab wound.

Progress after the Operation.

The patient was kept in the operating theatre after the operation. At the end of the operation his condition was satisfactory. About half an hour later his condition changed suddenly, and he became profoundly shocked. A plasma drip was established by cutting down onto the vein. The vein ~~vein~~ showed marked spasm, and the plasma had to be forced in with a sphygmomanometer. After he had received about half to three-quarters of a pint, his condition began to improve. The plasma was followed by whole blood, which had been directly cross-matched. Three hours later his condition was improved to satisfactory level to allow him to be removed from the table to his bed, which had been brought to the theatre. This was done slowly. It was noted that there was a marked fall in blood pressure, and the pulse rate rose to one hundred and twenty. The blood transfusion was carried on, and continuous oxygen, and coramine given at intervals.

Two hours later he was removed to the ward very slowly. Once again his blood pressure fell, and his pulse rate rose. Seven hours later his condition was very much improved. His pulse was much stronger, and was now only a hundred. He stated that he felt quite comfortable. He had had three pints of blood by now.

At three o'clock the following morning he suddenly developed a profuse Haematemesis, and was shocked. Blood had to be administered. He came round again from this, and seemed to appreciate that he had lost his arm, and it appeared to upset him.

At seven o'clock his condition suddenly deteriorated. He became acutely dyspnoeic, signs of peripheral circulatory collapse appeared. Further blood was given, and Oxygen was administered continuously. His condition rapidly got worse, and he died at ten minutes past eight that morning.

A Post Mortem was not allowed.

There was no pathological report made on the operation specimen.

Differential Diagnosis.

The differential diagnosis in a case of Haematuria includes the following diseases:-

Urinary Tract Infections.

Renal.

- Benign or Malignant Tumours.
- Nephritis. (Acute or Sub-acute.).
- Acute Pyelonephritis.
- Calculus.
- Tuberculosis.
- Hydronephrosis.
- Polycystic Disease.
- Oxaluria.
- Nephralgia.
- Injury.
- Actinomyces.
- Aneurysm of the Renal Artery.
- Essential Haematuria.
- Drugs. Sulphonamides. Iodides.

Ureteral.

- Calculus.
- Benign or Malignant Tumours.

Vesical and Prostatic.

- Papilloma or Carcinoma of the Bladder.
- Acute Cystitis.
- Bilharziasis.
- Tuberculosis of the Bladder or Prostate.
- Prostatic hypertrophy or Carcinoma.
- Prostatitis.
- Calculus or Foreign Body.
- Trauma.

Urethral.

- Acute Urethritis.
- Impacted Calculus.
- Trauma.
- Rupture of the Penile Urethra.
- Caruncle or Urethra.

Systemic Diseases.

Renal Infarction in Endocarditis.
Arteriosclerosis.
Leukaemia, and other blood diseases.
Purpura.
Hypertension.
Scurvy.
Haemophilia.

Disease of the neighbouring organs involving the urinary organs.

Carcinoma of the Uterus, Vagina, and Rectum.
Diverticulosis.

Benign or Malignant Tumours.

These may be divided into three groups. The first group consists of Epithelial tumours. 1. Papilloma of the renal pelvis. 2. Malignant papilloma of the renal pelvis. 3. Epidermoid carcinoma of the renal pelvis. 4. Adenoma of the renal parenchyma. 5. Papillary adenocarcinoma of the renal parenchyma. 6. Alveolar adenocarcinoma. The second group are tumours of connective tissue origin. 1. Fibroma. 2. Lipoma. 3. Leiomyoma. 4. Angioma. 5. Myxoma. 6. Sarcoma. The third group are the tumours due to developmental abnormality. 1. Embryoma. 2. Hypernephroma. (Also comes under Papillary adenocarcinoma). These tumours show relative the same symptoms. The first may be a dull lumbar pain, or an attack of profuse haematuria. The pain may be missing altogether. Varicocele may be present if the tumour lies on the left side, where pressure of the tumour spread on the spermatic vein entrance causes it. The kidney may be enlarged and palpable. If the growth is malignant it may be hard, irregular, and fixed. The presence of secondaries may be the first sign. Any of these may be present. It is by special examination that any real diagnosis may be made. Straight x-ray may show an enlargement of the renal outline. Catheters passed along the ureters may help to decide if the blood is coming from a ureter. Retrograde pyelogram may give a guide to the diagnosis. The simple papilloma gives a smooth negative filling defect against the positive iodide shadow. The malignant papilloma gives an irregular filling defect. Hypernephroma gives an area where the calyces are absent, and around the tumour the calyces are drawn into long narrow processes. In alveolar adenocarcinoma the calyces are often surrounded by growth. The main diagnosis is dependant upon the final pathology of the tumour. The patient only showed one attack of a profuse haematuria, and after it the passage of clots. There was nothing on examination. On special examination the cystoscopic report is only able to tell us that there is some pathology at the upper pole of the left kidney, which is a Renal Tumour. It is only by going to the pathological report that we are able to definitely state that it is an Hypernephroma.

Nephritis. (Acute or Sub-acute).

Acute Focal Nephritis. Profuse haematuria. Comes on usually during the height of an acute streptococcal disease. Albuminuria and blood and granular casts found on examination of the urine. Acute Glomerulonephritis. Onset usually insidious. May be malaise, pyrexia, and tachycardia. Coincident with the onset oedema, hypertension, and urinary changes appear. These urinary changes show the presence of blood. This is however not very profuse, though may make the urine red or smoky. Albuminuria is also present. The other features present rule out hypernephroma. The sub-acute stage usually gives a previous history of nephritis. In this trouble the blood in the urine consists of only a few red blood cells.

Acute Pyelonephritis.

This condition starts as a sudden onset of pain usually in both kidney regions radiating to the iliac fossae and suprapubic area. There is increased micturition and a marked temperature rise. The urine contains albumin and on microscopic examination red blood cells are seen.

Calculus.

This condition shows itself by pain. It is of a dull aching nature situated in the lumbar region. Renal colic may be present when the calculus is mobile. Frequency of micturition is sometimes present. Haematuria is a very important sign, but a profuse haematuria is very exceptional, and blood clots are uncommon. It is most intense when the pain is severe. In an infected calculus it is usually microscopic in the urine.

Tuberculosis.

This condition usually occurs in early adult life. Bladder symptoms predominate, and nocturnal frequency is the chief complaint. A dull persistent lumbar pain is early due to the tension of the renal capsule. Haematuria when present is usually recognisable as a few red blood corpuscles in the urine. Tubercle bacilli may be found. Cystoscopic examination may give a definite diagnosis.

Hydronephrosis.

This condition is more common in females. The onset may be insidious or it may be very sharp. The start may be a lumbar pain. At first polyuria may be present. The cyst may be palpable. Haematuria sometimes occurs in open hydronephrosis, from pelvic congestion. The condition can be recognised by retrograde pyelography.

Polycystic Disease.

This condition is chiefly occurring during infancy, but symptoms may not develop until adult life. Both kidneys are affected, and are several times their normal size. There is a failing renal function, and a haematuria. This haematuria may be quite symptomless. The condition can be recognised by pyelograms.

Oxaluria.

This condition occurs when the amount of oxalic acid, in the form of calcium oxalate is excessive. The cause may be exogenous, or endogenous. It often occurs in a dyspeptic, nervous individual. The symptoms may mimic all those of a renal, ureteric, or vesical calculus, but are not aggravated by exercise. There may be renal ache to renal colic, and a few red blood cells to a frank haematuria. Diagnosis is made from the other conditions, and in uninfected urine free from phosphates when an excess of calcium oxalate crystals are found and some red blood cells.

Nephralgia.

This condition shows a more or less severe and persistent type of unilateral renal pain. Disturbances of micturition may be present. Haematuria may be met with. This condition can only be present after a full examination of the whole urinary tract, and other diseases are ruled out.

Injury.

There is the history of an injury to the person, and proceeding upon it, the presence of haematuria. The kidney may be contused or show cortical tears, or be damaged completely. There are other signs of kidney damage.

Actinomycosis.

This condition may be primary to the kidney or from a nearby organ. The patient goes rapidly downhill, and shows abdominal pain, lassitude, loss of weight, night sweats, and evening pyrexia. Urinary symptoms are variable. Pus cells may be found in the urine. After a time you get a mass in the loin, which is tender. Haematuria is rarer than in tumour cases. The diagnosis may depend upon the pathological report.

Aneurysm of the Renal Artery.

This condition is usually post-traumatic. The features are those of internal haemorrhage, and the presence of haematuria may be a guide. Operation is the point of final diagnosis.

Essential Haematuria.

This condition shows bleeding from the kidneys, which is more or less intermittent and severe. The average age for it is about forty-five years. All other causes of haematuria are ruled out before this diagnosis is made.

Drugs. Sulphonamides. Iodides.

When crystals of sulphonamides form in the kidney they may cause irritation and lead to bleeding. This condition arises with the use of certain sulphonamides where they are not properly excreted. Iodides are liable to cause dysuria and haematuria.

Ureteral.

Calculus.

This condition arises usually from the passage of a stone from the kidney. Renal colic occurs. If the stone lies near the bladder the symptoms may be passed to the bladder. Tenderness may be found over the ureter. Frequency of micturition may occur. Haematuria usually occurs, either intermittently or constantly. The diagnosis is reached by X-ray and Pyelography.

Benign or malignant Tumours.

The primary growth is very rare. The benign tumour consists of the Papilloma. Haematuria is the first symptom, followed by pain and renal enlargement. The malignant tumours are commoner than the benign. There are two types. The papillary and the epidermoid. Haematuria is again the first sign, followed by pain. Cystoscopic examination with retrograde pyelogram help to exclude a lesion higher up.

Vesical and Prostatic.

Papilloma is the main benign tumour of the bladder. They may be pedunculated or sessile. The commonest and only symptom is haematuria. Pain occurs late when the bladder fills with clots. The condition usually occurs in young males. The diagnosis is made by cystoscopy.

Carcinoma .

This may be a malignant papilloma, adenocarcinoma, infiltrating carcinoma, or a squamous epithelioma. The features are mainly Haematuria, and frequency, and dysuria. The diagnosis is made by cystoscopy and biopsy.

Acute Cystitis.

This condition is an inflammation of the bladder. It shows features of frequency of micturition, scalding pain, pyuria, bacilluria, and sometimes haematuria. The diagnosis may be made positive by cystoscopy and urine examination.

Bilharziasis.

When the condition appears in the bladder there are usually other signs of it in the body. Haematuria is the first sign of vesical bilharziasis, and is initially painless, terminal and slight in amount. Later there is frequency of micturition, and finally, dysuria. Diagnosis is made by history of the disease, and examination, especially cystoscopic, which however does not exclude infection higher up the urinary tract, unless watched for.

Tuberculosis of the Bladder or Prostate.

Tuberculosis of the bladder differs little from acute cystitis, and the difference is made by bacteriological and cystoscopic examination. Tuberculosis of the prostate is a secondary lesion, and this other lesion is usually found. The patient complains of as well as the primary lesion, frequency and difficulty with micturition, and terminal haematuria. On rectal examination the tubercular nodules may be palpated.

Prostatic Hypertrophy and Carcinoma.

Simple prostatic hypertrophy usually occurs about the age of fifty. Frequency of micturition, and later there may be difficulty in the passing of urine. Haematuria, due to the congestion of the urethral mucosa occurs, but is seldom copious or persistent. On rectal examination the prostate is enlarged but soft.

Carcinoma of the prostate may show itself as urinary troubles or the first signs may be the presence of secondaries, e.g. pain in the back. The prostate is very hard on examination, and nodular. Haematuria occurs but is not common.

Prostatitis.

This condition shows itself with the primary posterior urethritis, with pain in the perineum. Defaecation is painful. Haematuria may be present.

Calculus.

This condition occurs in older men. It is due to the deposition of calcium salts in the prostatic tissue and also to the presence of infection. There is frequency of micturition, a terminal haematuria, and pain referred along the urethra.

Trauma.

Trauma from without is rare. It is usually due to the passage of a bougie or catheter. The patient complains of pain in the perineum, and the passage of a drop of blood when the instrument is withdrawn.

Urethral.

Acute Urethritis.

There is irritation and redness at the meatus and slight mucopurulent discharge. Later there is pain on micturition, redness. There may also be some haematuria.

Impacted Calculus.

The calculi that lodge here have their origin higher up. The calculus may lodge in any part depending upon its size, and shape. The stone may be come impacted suddenly or slowly. It may stop the passage of urine or allow it to pass in drops. The calculus rubbing on the wall may cause haematuria.

Trauma.

This is usually due to the passage of an instrument, with bad handling, and the causation of bleeding.

Rupture of the Penile Urethra, and the Bulb of the Urethra.

The penile part is rare. The bulb may be injured by violence to the perineum. A little blood escapes from the urethra, but urine is shut off from the bladder. Extravasation of urine occurs late.

Caruncle of the Urethra.

This condition causes pain which is often present at all times, and which is aggravated by movement and micturition. Haematuria, a blood-stained urethral discharge and frequent and difficult micturition may be met with. Inspection of the urethra shows the diagnosis.

Systemic Disease.

Renal Infarction in Endocarditis.

When this occurs in a case, there is pain, and haematuria, and the kidney may be palpable. The other signs of Endocarditis are also present, as is the history. It is due to emboli formation being allowed to pass into the blood stream, and occurs in Acute Bacterial Endocarditis.

Arteriosclerosis.

This is shown as a change in the arterial coats, by a thickening and degeneration. It is accompanied by all the signs of arteriosclerosis. The haematuria occurs as a renal symptom, and is the sequela of chronic nephritis.

Leukaemia, and other blood diseases.

Acute Leukaemia is a condition usually occurring under twenty years of age. There is pallor, swelling of the gums, and haemorrhage usually from the gums, nose, stomach, but may occur from the kidney. There is enlargement of lymphatic glands. The diagnosis of this condition and other blood conditions similar to it is by blood examination.

Purpura.

This condition may occur in various conditions, and the different conditions are recognised by their various symptoms, and blood examination.

Hypertension.

This is divided into two types. The first is Benign and the second is the malignant. The benign type arises over a number of years, while the malignant runs a very short course. Certain kidney conditions arise from these cause the presence of red blood cells in the urine.

Scurvy.

This is a condition due to the lack of Vitamin C. The lack of this causes haemorrhages to occur, and there may be the passage of red blood cells in the urine.

Haemophilia.

This is a condition limited to males where there is a tendency to excessive haemorrhage from slight injuries and by a prolonged coagulation time of blood.

The haemorrhages may be internal or external. The joints are especially affected. Haematuria may occur but is rare.

Disease of the neighbouring organs involving the urinary organs.

Carcinoma of the Uterus, Vagina, and Rectum.

This may be by direct spread or by secondary spread.

Diverticulosis.

This condition occurs usually at middle age or later.

There are present in the descending bowel usually a number of small diverticula.

The name diverticulosis being given to them when there are no symptoms.

These diverticula may become inflamed and become painful, tender, and rigidity over the area. They may affect the bladder or other organs nearby, and the result may be on rare occasions a slight haematuria.

Discussion.

This is a case of Haematuria, and may be satisfactorily divide into two parts.

Part. I. Course, treatment, and result of the primary lesion.

Part. 2. Course, treatment, and result of the secondary lesion.

The patient, David Dawson, 36 years of age, found himself unable to pass urine one night, during August. This continued till the next day, when he passed urine, and also a large quantity of blood. He was admitted to Ward 29, of the Royal Infirmary, Edinburgh, where his haematuria cleared up after two days, and he was discharged home. He returned on two occasions as an out-patient to Diagnostic Theatre of the Royal Infirmary, Edinburgh. The diagnostic theatre is a theatre reserved for the special examinations of the Urinary Tract. Here on the occasion, the 19th. September, 1946, a cystoscope was passed, and the bladder filled with sterile water, and its capacity noted, which was three hundred ccs. plus, which is an average reading. Both ureters were now catheterised quite easily, the right side to thirty cms, and the left side to twenty eight cms., thus showing no obstruction in the ureters. Retrograde pyelograms were taken. From these a slight difference was noted on the left side. The bacteriological report on the urine was negative. The conclusion reached was not a decisive one. There was a suggestion that the bleeding came from the left kidney, and that a lesion was present in the upper part. Before any definite diagnosis was given, however, a request for a repeat examination was made. On the 3rd. October, 1946, the patient again reported to Diagnostic Theatre. The examination carried out on the first visit was repeated. On this occasion, a diagnosis of Left Renal Tumour was put forward after examination of the X-rays. The patient was referred to Wards 5-6, of the Royal Infirmary, Edinburgh, for opinion and treatment if possible. The operation of Nephrectomy was decided upon as satisfactory for removal of the primary lesion, as no secondary lesion could be found. He was admitted to Ward, 6, of the Royal Infirmary. On admission he looked a healthy, well built man, with a good covering of fat. On physical examination, no positive signs were noted. His cardio-vascular and respiratory systems were normal. His blood pressure was about normal limits. On the 29th. October, 1946, he was operated on by Mr. R.L. Stewart, for the removal of his left kidney. Premedication for the operation consisted of 1/3 gr. Omnopon, and 1/100 gr. Atropine. The anaesthetic was given by Dr. Gibbs, and was Ethyl Chloride, Gas, Oxygen, Ether. The patient progressed satisfactorily after the operation, there being no pain or discharge from his wound. The posterior rubber drain being removed in forty eight hours. He felt well, and was passing urine well. On the eighth of November, he was discharged for further convalescence at Beechmount. The wound was healing well. The pathological report on the left kidney was received on the ninth of November. This stated that the kidney showed the presence of a renal carcinoma of the type 'Hypernephroma'. There was no sign of extension of the tumour tissue into the veins. As the tumour was sharply demarcated from the adjoining kidney tissue, it was suggested that it was of low grade malignancy.

On the twenty second of November, he reported back. He was up and walking, and the wound had healed satisfactorily. He was discharged.

As is the manner of many wards in hospitals it is the custom for the patient to report back again even after discharge, the patient reported back again on the twenty sixth of April, 1947. He was feeling very well.

On the twenty eighth, May, the patient returned to an out-patient session complaining of pain in the left shoulder. On examination of the left shoulder, cervical scoliosis, congenital high scapula, and torticollis was present. Tenderness was present about the level of the surgical neck of the left humerus on palpation. No actual thickening of the bone was palpable. It was decided to X-ray the region.

The patient's left shoulder was x-rayed on the twenty ninth May. The report on this x-ray stated that an osteolytic lesion involving the upper part of the shaft of the Humerus, with some extension into the soft tissues on the inner aspect, and reactionary bone changes, were present. The appearances were those of a secondary neoplasm, and typical of a secondary of a renal tumour.

On the fourth June, further x-rays were taken of the Skull, Chest, Pelvis, Left Arm, And Forearm. These further films confirmed the presence of the secondary neoplasm in the upper part of the left Humerus. The other films were negative, except in the one of the Skull, where a doubtful osteolytic area was thought to be seen in the lateral view. Further x-rays were requested.

The patient reported again on the second of July, and stated that he still suffered from the pain. Further x-rays were taken of the skull, and the shoulder region.

Thereport on these last x-rays showed that there was no secondary neoplasm in the skull, and that the secondary neoplasm in the Humerus had increased in size. After the result of this x-ray report, all the facts of the case were put before the patient. The operation decided upon was that of a 'Forequarter Amputation' which would be complicated by the congenital high scapula etc.. The seriousness of the operation was told to the patient, and also his future if he did not have the operation. The patient after thinking it over, he decided upon the operation.

The patient was re-admitted on the sixth of July, 1947.

On examination this time some thickening of bone below the surgical neck of the Humerus was palpated. There was also tenderness on pressure over the swelling.

The patient was prepared for operation. The operation of 'Interscapulo - Thoracic Amputation' was carried out by Mr. R.L.Stewart on the eleventh of July 1946. The premedication was given one hour before operation, and consisted of 1/3 Omnopon, and 1/100gr. Atropine. The anaesthetic was Ethyl Chloride, Gas, Oxygen, and minimal Ether. An endo-tracheal was passed. The anaesthetic was given by Dr. Gibbs.

The patient was kept on the operating-table after the operation. At the end of the operation his condition was satisfactory. Half an hour after the operation, the patient starting showing marked signs of shock. A plasma drip was started by means of a cut down drip. The vein was in marked spasm. A sphygmomanometer was attached and the plasma forced into the vein.

The patient's condition improved slowly, and blood was given after, three-quarters of a pint of plasma.

Three hours later the patient was removed from the operating table to his bed in the operating theatre. Continuous blood, and oxygen, and coramine were given. He was later transferred to the ward, and seven hours later his condition had improved. He had by then received three pints of blood.

At three o'clock in the morning he developed a profuse haematemesis, but appeared to recover from this. At seven o'clock in the morning his condition suddenly deteriorated, and he developed acute dyspnoea, and peripheral circulatory collapse.

Blood transfusion was started again, and continuous oxygen given. The patient's condition rapidly deteriorated, and he died at ten minutes past eight in the morning.

One form remains benign for many years, and then becomes malignant, while the other is malignant from the start.

However against this theory are one or two cases where the tumours have been encapsuled and were strongly malignant. In this very case the pathologists report states that the tumour was well demarcated from the rest of the kidney tissue and that there was no invasion of the veins, yet one known and fatal metastases took place.

The tumour is usually placed at the upper pole or lower pole of the kidney, and varies in size. The appearance of the tumour is usually of a firm nodular mass which in many cases projects definitely beyond the limits of the kidney. It is usually surrounded by a capsule of condensed renal tissue, which encloses areas of yellow neoplasm, with areas of haemorrhage, and bands of grey fibrous tissue. The larger neoplastic nodules may have undergone central softening. It may have invaded the renal pelvis and even the ureter. In some cases quite frequently, it has grown along the renal vein.

The microscopic picture may be varied just as is its macroscopic one.

The cells are usually large, and rounded with a peculiarly clear or vacuolated cytoplasm. This vacuolation is said to be due to the presence of lipid and glycogen material. Sometimes the tumour is made up of dark granular cells, and is said to be a highly malignant form. The arrangement of these cells is usually one of three ways:-

1. Cystic papillary formation.
2. Alveolar arrangement of solid cords of cells divided by thin septa into masses.
3. Occasionally a definite tubular arrangement.

The stroma is on the whole scanty but bloodvessels are marked, and the vessel walls seem to be formed of tumour cells.

In the present case the tumour is that of a typical one, the tumour being situated at the upper pole, and is demarcated from the renal tissue.

Microscopically it fits in with the second type as mentioned above.

Spread of this tumour is varied. It may remain silent for years, the disease noticed as the result of the trauma caused by a secondary lesion of the hypernephroma, or it may be malignant from the beginning.

In the usual case after a certain period of unknown time the capsule of the benign tumour breaks down, and starts growing into the kidney tissue. There is a special tendency for it to spread into the renal veins, and thus metastasize in this way. Another way to note is that in some cases the blood-vessels of the tumour are composed of tumour cells, and thus spread may result from these. It is about this time that haematuria will occur. The cause may be accounted for by the numerous large thin-walled blood spaces, which readily rupture into renal tubules. The tumour also causes deformity of one or more of the calyces of the renal pelvis, and this may be detected by the pyelogram.

The commonest focus of spread is to a bone, and in about sixty per cent of cases a solitary bone metastasis is all that is found. The order is the upper end of the Humerus, as occurred in this case, Spine, Femur, Pelvis, and Ribs. Other places of involvement are lungs, and liver, and the lymphatic nodes by lymphatic spread.

The secondary lesion in the bone when it is small it appears as an opaque, greyish focus in the interior of the affected bone, and causes no striking change in it, but as the tumour grows the adjacent bone becomes encroached upon, and rarefaction occurs for some distance around it. New bone is very rarely formed. A small localised enlargement of the bone at this area usually occurs. Thus you have the secondary tumour mass, a thin shell of bone, and intact periosteum. From this can be seen that the slightest knock can easily cause a fracture to take place. Pain in this area is caused by pressure and irritation of the nerve-ending in the bone.

On rare occasions metastases from a hypernephroma have been found in the Thyroid gland, and up to the present only seven cases have been found. (Annals of American Surgery). Thus a range of organs can be affected.

The tumour both primary and secondary lesions will continue to spread, and if not treated in a satisfactory manner, till the lesions have progressed to such an extent that life can no longer be sustained and death ensues.

Features.

The main symptoms of a case of Hypernephroma are three in number:-

- I. Haematuria.
- II. Renal Swelling. (Tumour).
- III. Pain.

Haematuria is the commonest of the above list of symptoms occurring in the majority of cases, and is the first thing to be noticed by the patient. It usually does not occur till the tumour is far advanced. It is quite often painless, and is regarded by some people that if haematuria occurs, and is painless, it is a positive sign of hypernephroma. The haematuria is spontaneous, and intermittent. The urine passed is often port wine in colour, and may contain worm-like clots, suggesting a ureteric origin of these clots. The extent of the haematuria varies. It may be very severe or only a small amount, the amount having no relation to the size of the tumour. The bladder may become filled with clots of blood causing dysuria or retention.

The patient's first symptom was the stoppage of the passage of urine. When it did occur again, he passed a large amount of blood in it, and also some clots. There was no pain, a point which has already stated may be regarded by some people as the positive sign.

It is to be presumed that the patient had bleeding from the tumour and that this filled the bladder, but it did fill it enough to cause the patient no symptom then and thus make him micturate. The blood clotted and prevented the passage of urine, and it was only later that it was freed and urine allowed away.

Renal swelling may be the first sign that is noticed in a case. On the other hand there may be no swelling palpable, though other symptoms may be markedly present. Care must be taken at the examination of the kidneys to differentiate any palpable swelling suggestive of a kidney as it may be on the left side an enlarged spleen or part of the colon, or small bowel, and on the right side an enlarged liver or part of the colon or small bowel. A swelling of the upper pole of the kidney is not easy to palpate. The swelling is usually hard and irregular and moves freely on deep inspiration. When a fixed mass is recognised as pertaining to the kidney, it is usually a bad prognostic sign.

The patient in this case did not show any palpable mass on examination even after two months had passed since his attacks of haematuria.

The subject of pain in these cases is varied. In some cases no pain is felt at all, while in other cases three types of pain may be felt. These are:-

- I. Persistent aching pain due to the presence of the growth.
- II. Ureteric colic due to the passage of blood clot along the ureter.
- III. Pain due to clot in the bladder, and increased desire to micturate.

The patient suffered from hypogastric pain, frequency of micturition, the passage of clots of blood, which would place his pain in the third group. Sometimes a feature which is found in many cases is the appearance of a spontaneous varicocele. This is a common occurrence in people on the left side of the body, but when it occurs on the right side of the body, it is very suggestive of renal growth. It is due to pressure on the spermatic vein. A varicocele due to renal growth does not disappear on lying down, as does the ordinary type.

In the later stages of this disease, various general disturbances occur. These may be lassitude, loss of weight, anaemia, and a long continued fever. This fever is said to be a protein fever due to a breaking down of tissue. This fever may be the only symptom present, as it was in the case quoted in the Lancet, Aug. 14th. 1948. Here it was the only symptom for a year. It was only on cystoscopic examination which showed difficulty in passage of a ureteric catheter on the left side. On x-ray a picture of renal tumour was found. The renal tumour was removed by nephrectomy, and on doing this the unknown pyrexia cleared up.

The only general effect that the patient complained of, was that he thought that he had lost a little weight. This is reasonable and is to be expected where a new growth formation is being carried on to such an extent in the body.

On examination of the patient, you usually find a man of between forty-five to sixty years of age. He has the appearances of health, and may present no positive examining sign. In others the palpable swelling in the loin may be made out, and tenderness over a certain region obtained. If secondaries have occurred these may show positive signs, e.g. enlarged lymph nodes though rare, etc.

Exclusion of the other causes of haematuria must now be made by further examination of a different kind.

These examinations include blood pressure readings, which are very important. In the present case the patient presented an average blood pressure reading. The urine should be examined for Specific Gravity, Colour, Reaction, Sugar, Albumin, and Blood. The main parts here are the presence of Albumin and Blood. The amount of albumin if present should be noted carefully as it would not be consistent with this disease, to get heavy albuminuria. The urine should be examined microscopically to actually view, and detect in this way the presence of red blood corpuscles, and as to the number present. If you find only a few red blood corpuscles present it does not suggest haematuria of hypernephroma. The urine is usually of a port wine colour, and gives a positive proof for blood both chemically and microscopically. Albumen and casts may be found, probably due to areas of nephritis around the tumour. Haemoglobin, and Red Blood counts and White Blood Counts and Differential examinations should be done. These are helpful if the haematuria has been very severe as the patient may have a very low haemoglobin, and require blood transfusion, and also to disprove some of the medical reasons for the causation of haematuria.

Renal Function tests are regarded as useless at this stage of examination.

The most important part of the examination is that of Cystoscopy.

Here the patient is placed in the lithotomy position, and under strict aseptic conditions, a catheter, usually 2IF in size, is passed per urethra. The bladder is filled, and its capacity noted. It should be about three hundred ccs. The inside of the bladder is then viewed, and the bleeding may be observed coming from the bladder walls in cases of vesical bleeding. In hypernephroma where, bleeding if it is occurring, spurts of blood may be observed coming from a certain ureteric orifice.

On observing this, in present, it helps to localise the bleeding to that specific ureter or kidney. Ureteric catheters are now passed and specimens of urine are taken from each kidney for examination. Straight x-rays are taken of the renal tract, and then eight to ten ccs. of 12.5% of sodium iodide are injected into each ureteric catheters, and more x-rays taken. This last method is known as Retrograde Pyelography.

Another test is to give ten to twelve ccs. of a 0.4% solution of indigo-carmin intravenously, and the time elapsing before coloration of the urine from each ureteric orifice is noted.

Normally the colour should be seen within seven minutes, deepening in intensity to dark blue. Delay in the time of appearance is evidence of renal dysfunction. This test is very rarely done as it is not needed. Another x-ray of a different type is also taken. Here a substance known as Uroselectan-B is injected slowly intravenously, and X-rays of the abdomen are taken before injection, and at ten minutes, twenty, forty minutes, intervals after injection.

The results of the x-rays are:-

1. In the aerily polar growth the calyces are at first elongated and narrowed and the cup-like minor calyces obliterated.
2. When the tumour increases in size the calyces may become obliterated, pressure on the renal pelvis may cause flattening or concavity of its outline.

This last examination was carried out on the patient on two occasions. On the first time the only positive evidence was that the upper major calyx was attenuated and stretched in its supero-medial portion. On the second examination the left kidney shows the upper minor calyces are attenuated and flattened from the top. The upper margin of this shadow corresponded with a portion of the circumference of a rounded mass seen occupying the upper pole of the kidney.

These features were regarded as of a lesion of the kidney, and a diagnosis was made of a left renal tumour, though no definite statement as to the type of tumour was made.

Treatment.

The treatment of the case was decided upon, and the decision was that of the operation of Nephrectomy.

There are two methods of exposing the kidney.

a) Lumbar Method.

This is divided into two parts.

I. The Oblique Incision.

The incision commences at the outer border of the erector spinae, and passes downwards and forwards parallel to and half an inch below the last rib.

The aponeurosis of the latissimus dorsi and some of its muscular fibres are divided, the lumbar fascia, and the posterior portions of the abdominal muscles are split. The erector spinae and quadratus lumborum are retracted to the spine. The peri-renal is then exposed, and incised, the kidney sought for and gently brought up into the wound.

II. The Vertical Incision of Edebohl's and Mayo.

This starts in the angle between the erector spinae, and the last rib, and it runs vertically downwards just inside the outer border of the erector spinae to the iliac crest.

The sheath of the erector spinae is opened and the muscle retracted inwards, while the lumbar aponeurosis is divided, and a part of the aponeurosis of the latissimus dorsi. The peri-renal fat is then exposed and opened.

b) Abdominal Method.

The abdomen is opened, usually by a paramedian incision, the intestines are packed aside and the peritoneum of the posterior abdominal wall incised vertically immediately outside the ascending or descending colon. The kidney is then found.

For removal of a tumour growth the most popular appears to be the Lumbar method using the Oblique Incision with the patient in the Nephrectomy position. The patient lies upon his sound side with his upper arm supported on an arm rest. An elevated bar passes across beneath him just below his costal margin, to separate the gap between his lower rib, and the iliac crest. The underneath knee and hip are flexed up, while the upper knee and hip are straight.

After the kidney has been exposed and brought into the wound, it is carefully cleaned, especially its pedicle. The ureter is also found. The renal pedicle is then doubly ligated with strong silk. The ureter is ligated as well in the same fashion. The pedicle and ureter are then divided. The kidney is then removed. Most surgeons remove part of the peri-nephric tissue as well. The abdomen is then closed in layers with catgut, after full haemostasis has been obtained. The skin is closed with silkworm gut. Sometimes a rubber dam drain or rubber tube drain, is placed in position before closing the abdomen.

The patient's operation followed this method and proved satisfactory. The choice of anaesthetic for an operation of this type is dependant upon the health of the patient.

The operation being retro-peritoneal does not require general anaesthesia. The degree of relaxation of the muscles must however be satisfactory enough to allow the patient to be in the lateral position. It is recommended nowadays that the premedication should be carefully chosen to allow a better induction and thus an easier transgression to anaesthesia. The patient in this case receiving 1/3 gr Omnopon, and 1/100 gr Atropine about one hour before operation. This is a very satisfactory pre-medication.

For induction gas and oxygen are recommended followed by cyclopropane or minimal ether, and is adequate and satisfactory if closed circuit technique is used. Ether saturation of the body should be avoided because this drug produces cloudy swelling in the epithelium of the convoluted tubules of the kidney, and some temporary anuria. Curare has been suggested by some anaesthetists, but as it depresses respiration, it is dangerous here as the patient is embarrassed respiratorily due to being placed in a lateral position.

The patient received Ethyl chloride for his induction, which gives a satisfactory depth in about thirty seconds for the passage of an endotracheal tube, and carried onto ether, and then onto gas, oxygen, and ether. The anaesthetic proved very satisfactorily and was given by a Boyle's anaesthetic machine.

To treat a hypernephroma in any other way than nephrectomy has proved unsatisfactory. In very advanced cases of hypernephroma with secondaries, a conservative treatment is probably the best.

Irradiation has been tried, but up to the present has had little to offer in treatment. It has been stated however that it may reduce the size of the tumour and help for surgical removal. It is also said that it may cause temporary disappearance of pulmonary metastases, but they recur again.

At the end of the operation the patient's condition was satisfactory, and he made a good recovery. He had no more trouble with his urine. The pathological report on the specimen of the kidney showed of an hypernephroma, but it stated that there was no sign venous invasion, and that the tumour was well demarcated, and mitoses were rare.

These were all excellent points in favour of a good prognosis.

However about six months later the patient reported back to the ward, complaining of pain in his left shoulder region which passed down his arm, and tenderness was present. Because of his past history he was sent for x-ray and evidence of a secondary lesion from a renal tumour.

Thus in six months there had appeared a secondary growth in the Humerus. It is difficult to judge whether this started at the time of operation or whether it had just occurred before the operation, though I think it to be more likely to occur at the time of operation.

X-rays of the chest, skull, and pelvis in the next few days showed a doubtful lesion in the skull, which was later proved to be negative. However due to this marked delay in the re-examination of the skull, a full month went by during which the tumour growth in the Humerus appeared to advance very rapidly as if there had been a change in its malignancy.

Due to the position of the growth, it was decided that an Interscapulo-Thoracic Amputation was to be done.

Bergus method of this operation appears to be the method usually carried out. The patient should be placed near the edge of the table, so that the shoulder overhangs, a sandbag being placed behind the opposite shoulder. An incision is first made along the upper border of the inner two-thirds of the clavicle. Through this incision the clavicle is then exposed, its middle third cleared and the bone cut through either with a large pair of bone forceps, or with a Gigli saw. The outer half of the clavicle is pulled forcibly upwards, and its under-surface stripped.

The outer end is then cut through, the middle portion of the bone being removed. The subclavian vessels and brachial plexus are now exposed, the artery and vein are ligatured in two places opposite the first rib, and divided between ligatures. It is usual to divide the artery first, raising the arm so as to empty it of venous blood before dividing the vein. An injection of 2% novocain into the main trunks of the brachial plexus at this stage of the operation will diminish the shock involved in the subsequent division of these nerves. The suprascapular and posterior scapular arteries are now looked for in the posterior triangle, and ligatured.

The anterior flap is next completed by carrying the incision from the clavicle opposite the coracoid process downwards and outwards across the anterior axillary fold, obliquely across the axilla down to the inferior angle of the scapula, an assistant manipulating the arm so as to facilitate the cutting of the flap, which is reflected inwards and downwards. The pectoralis major muscle may be retained in the flap and divided close to the humerus, but for malignant disease in the neighbourhood of the shoulder-joint it is safer to reflect a sufficient flap inwards and to divide the pectoralis major and minor closer to the thorax.

The axilla is now exposed, the nerves are divided high up, and the rest of the contents (fat and glands) dissected downwards in one mass. The arm is then adducted across the chest, and a posterior incision made, this extends to the outer end of the clavicle, thence directly downwards to the inferior angle of the scapula. The limb is then removed by rapidly cutting through the trapezius, levator anguli scapulae, rhomboids, serratus anterior, and latissimus dorsi. As these muscles are cut through a few small vessels will need to be picked up, and ligatured, and the posterior scapular artery will be divided and require ligature, unless it has already been found in the posterior triangle. The large raw area left should be carefully washed, and bleeding-points looked for, the wound can then be sutured with drainage.

(Grey Turner).

The operation on the patient followed along the lines already mentioned though it was a more difficult operation due to the presence of the high scapula, scoliosis, and torticollis.

At the end of the operation the patient's condition was quite satisfactory. It deteriorated however, plasma was given intravenously. The change in the condition of the patient was probably due to the fact that the patient was not receiving oxygen any more as he did during the anaesthetic, and it was found necessary to force the plasma into veins, with the aid of a sphygmomanometer cuff. After three-quarters of a pint of plasma, blood was given. This blood had been cross-matched directly, and was of the patient's own group.

The patient was started on oxygen again. He was kept all this time lying on the operating table. He had not been moved at all, and had been kept covered by blankets, though he was not allowed to become over-heated. Three hours later he was moved from the table to his bed which had been brought into the theatre. It has been noticed that when people, who have had a severe operation are moved, the systolic pressure may drop, up to twenty mms Hg.

Considering the fact that the patient's blood pressure is not very high after the operation, and may be in the region of a systolic pressure of eighty to ninety mms Hg, or even lower, and a drop of twenty mms Hg will bring it down to that level where even though the condition of shock is treated, irreplaceable damage is done to organs of the body by that momentary fall in blood pressure. Accordingly his blood pressure did fall and his pulse rose. More blood was given, and coramine.

He was then transferred to the ward where his condition several hours later was improved considerably. It should however be noted that a fall in blood pressure would again occur during transit of patient to the ward. During the night the patient came round enough to realise that he was without an arm, and he appeared to be shaken by this understanding.

At three o'clock he developed the profuse haematemesis, and it was only after more blood that he recovered from this.

There are various causes for haematemesis, and they can be grouped as follows:-
Local diseases of the stomach.

1. Peptic ulcer.
2. Neoplasm.
3. Chronic gastritis.
4. Acute gastritis.

Passive congestion of the portal system.

1. Cirrhosis of the liver.
2. Congestive heart failure.
3. Tumours pressing upon, or thrombosis of the portal veins.

Blood swallowed.

Blood disease. Splenic anaemia. Acute leukaemia. Haemorrhagic diathesis.

Occasional causes.

1. Trauma.
2. Corrosive poisons.
3. Toxic. - I. Specific fevers. Yellow fever, Small-pox.
2. Various toxæmias, e.g. acute yellow atrophy.
4. Rupture of Aneurysm - Aortic or branches.

Of these different causes only four may really be said to produce a very profuse haematemesis, as is stated to have occurred in the report of the case.

These are:-

1. Peptic ulcer.
2. Cirrhosis of the liver.
3. Splenic anaemia.
4. Ruptured aneurysm.

This last list reduces our number, but I think perhaps in these cases we might be allowed to include Congestive cardiac failure.

Of this last list peptic ulcer is a very unlikely cause as though it does occur without previous symptoms of an ulcer, there are usually symptoms of some kind in regard to the upper part of the alimentary tract, which was not so in this case.

The other three can be ruled out, as previous examination of the patient, i.e. before the operation, showed no signs pointing to any of these diseases. Blood that is vomited up, may come from the rupture of the veins at the lower part of the oesophagus, or it may come from a congested gastric mucous membrane. It is very difficult to make out in this case any obvious reason for the patient's condition. As he showed none of the lesions mentioned, we may perhaps come upon Congestive cardiac failure. Perhaps if this occurred suddenly with the great pressure on the right side of the heart, and thus on the veins leading to the heart, congestion of the gastric mucous membrane might occur, and rupture of a vast area of the stomach might give a fairly profuse haematemesis.

However we are unaware of what the inside of the patient's abdomen was like post mortem.

Later on in the morning, about seven a.m., he developed acute dyspnoea, and peripheral circulatory collapse, and died at eight-fifteen, showing signs of Acute Pulmonary Oedema.

Acute pulmonary oedema is a condition which shows itself by a very sudden onset. There is a very intense dyspnoea. Cyanosis develops, and a frothy fluid often pink in colour may stream from the mouth or nose. The chest movements become very rapid, and the accessory muscles are brought into violent action. On percussion the note soon becomes impaired at the bases and working gradually up the chest. The vocal fremitus and vocal resonance become diminished. The breath sounds are at first vesicular with prolonged expiration, but soon become faint and obscured by rales or crepitations. The patient rapidly becomes unconscious, and death follows, the heart continuing to beat after the respirations have ceased. It may occur if treatment is unsuccessful within a few minutes.

This condition usually occurs after the age of forty, and is more frequent in the female than the male.

Various causes have been put forward for this condition. It is regarded that arterial disease and hypertension are common antecedents, and though the patient did have a slight hypertension, there was no obvious arterial disease present.

An anaesthetic is said to be one of the immediate causes, and here we have the patient receiving a long anaesthetic of gas, oxygen, and ether, which can cause both upset in the respiratory, and also circulatory system. Coronary occlusion and acute left ventricular failure are thought to be noteworthy causes, while in some cases dissociation of the action of the two ventricles has been supposed to be the cause, the right contracting forcibly while the left is in an enfeebled or asystolic condition. These last causes are perhaps great possibilities in this case, because the operation itself is of a shocking nature to the circulatory system, while several hours after it the patient developed a profuse haematemesis, which would again put a great burden on the heart.

In an operation of this type we are also up against other factors. Shock of the secondary type is the result of the loss of blood from a wound, and in a massive muscle cutting operation we are up against the gentle oozing from the muscle tissue itself, and it would appear to be a very large area for it to occur.

However another fact is that when a muscle is crushed certain products appear to be formed in the muscle, which bring about the appearance of shock, and mainly changes in the urinary tract and a uraemic condition appears. This may perhaps occur also when there is such a massive muscle cutting operation, and increase the shock which has occurred from the operation itself.

There may also have taken place a stage of irreversible shock at some time during the hours after the operation, and if this did occur the patient would not show any obvious change at once, but certain organs might be affected which led to the haematemesis, and the acute pulmonary oedema.

Conclusion.

Certain conclusions may perhaps be made from this case. From the pathological report we found that the tumour did not show any signs of spread, yet a metastatic deposit occurred, which shows that any tumour can not be regarded as not spreading from the pathological report alone, and in a case of tumour a careful examination must be carried out frequently on the patient, in order to catch any early deposit. The effects that occurred after the second operation are very confusing indeed. Unfortunately there was no post mortem done, and we are left without any idea as to whether there were any secondary spread to the abdominal organs. The type of operation, complicated by the additional factors around the shoulder region, must surely have played a part. However as to whether the haematemesis was caused by the collapse of the heart, or whether there was some other pathology present I am unable to say. I think though that there is the possibility of some toxin from the blood which passing through the body effects the blood vessels and causes a relaxation and a state of shock.

The origin of this toxin is the muscle tissue, and perhaps may be histamine-like in form.

The cause of death in this case is primary, the tumour growth, and secondary the effects of the operation.

Prof. Dr. Christian Goldmann.

Age 50 years.

Occupation: Housewife.

Address: Fourth Cottage, Hill of Health, Birmingham.

Doctor: Dr. Goldmann, 1, Ladbroke Grove, London.

History: 1904-1905, 1910.

CASE. NO. IV.

1904-1905, 1910.

Present: Swelling in the left breast.

History:

Present:

The patient states that she has felt a swelling of the size of the left breast for a long time (length of time unknown). She has never touched about it at the same time and has no pain from it or any discomfort. In my opinion the swelling is not malignant but the nature of the case has changed, and it has changed.

Several months before she developed swelling of the left side.

The swelling was not painful and she had no other symptoms.

A CASE OF CARCINOMA OF THE BREAST.

ITS COURSE AND TREATMENT.

She feels the swelling of the left breast and has no other symptoms. She had no change of the left breast before she was 40 years old, after which she began to feel the swelling.

Past:

She had the breast swollen for several years ago. In February 1904, she was admitted to the St. Mary's Hospital, Department of the Royal Infirmary, Birmingham, for treatment. A very extensive swelling of the left side of the breast was found. It responded to surgery, but the swelling was not removed. The left breast was removed and the swelling was not removed. There was no change in the swelling. In other operations, the swelling was not removed.

Name. Mrs. Christina Meldrum.

Age. 69 years.

Occupation. Housewife.

Address. Tavern Cottage, Hill of Beath, Crossgates.

Doctor. Dr. McNeish, I, Inverkeithing Road, Crossgates.

Admitted. 22nd. May, 1948.

Discharged. 28th. June, 1948.

Complaint. Swelling in the left breast.

History.

Present.

The patient states that she has felt a thickening of the skin of the left breast for a long time (length of time unknown). She has never troubled about it at any time. There has been no pain from it or any discomfort, in any form. She has however noticed that the colour of the area has changed, and is now bluish-black.

Several months before she developed twitching of the left arm. This was of short duration, and has never occurred again. There has been no redness of the breast or any discharge from the nipple.

She feels quite well. Her appetite is good, her bowels are regular. Urine is free from trouble. Her weight she thinks has been steady. She had an abscess of the left breast incised thirty seven years ago, after irritation due to carrying coal during a strike.

Past.

She had the breast abscess thirty seven years ago.

In February 1948, she was admitted to the Ear, Nose and Throat, department of the Royal Infirmary, Edinburgh, for treatment for a very extensive squamous epithelioma of the left antrum.

It responded to radiotherapy, but two glands were left however in the left supraclavicular region, and in view of the extent of the antral tumour, these were assumed to be secondary to the antrum tumour.

No other operations, or illnesses.

Social Conditions.

Food and Habits.

She lives in good surroundings with one of her daughters. She is well looked after, and gets plenty of good food.

Family.

Her husband is dead. She has had six children.

State on Examination.

Intelligence. Good.

Development. Good.

Muscularity. Good.

Nutrition. Good.

General Appearance.

She was a tall stoutly built lady, plethoric in appearance. She looks well. There is some proptosis of the left eye, and slight swelling of the left side of the face. She appears very fit for her age.

Temperature.

This was 97.6 degrees F. on admission.

Pulse.

This was 82 per minute on admission.

Respiratory Rate.

This was 20 per minute on admission.

Blood Pressure.

Systolic Pressure. 160 mms. Hg.

Diastolic Pressure. 100 mms. Hg.

EXAMINATION OF SYSTEMS.

THE BREASTS.

Both Breasts were present.

Inspection.

The breasts were pendulous in appearance, coming well down to the costal margin, and partially covering it.

The right breast showed no abnormal appearance.

The left breast.

This showed irregularity in part of its outline in its upper, outer quadrant. Here a blackened area of skin was visible- 3-4cms by 2-3cms. No obvious mass was seen. Near the area of discoloration the

skin had the characteristic appearance known as 'peau d'orange'. The nipple showed a little retraction but not especially marked. There was no sign of discharge from the nipple.

Palpation.

On palpation a mass could be felt. It was firm in consistence, and was inclined to be circular in outline though its whole border could not be palpated properly as it appeared to fade into the surrounding tissue in parts. It did not give evidence of fluctuation. It did not run away from the fingers, and appeared to be superficially adherent to the skin. It was roughly about 4cms. in diameter. The patient stated that it was tender when touched. It did not appear to be adherent deeply.

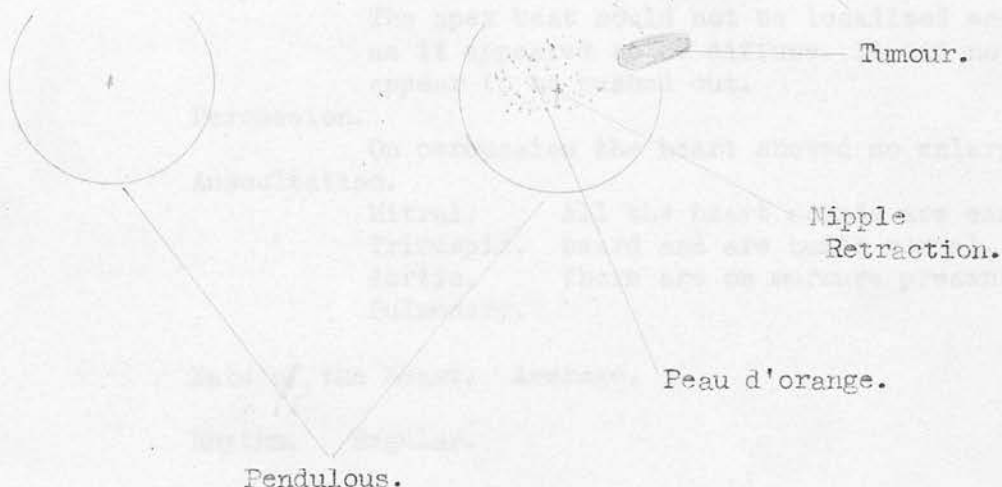
The right breast examination was negative.

No glands were palpated in either Axillae. Two glands could be palpated in the left supra-clavicular region, but none on the right side.

Two supra-clavicular nodes.

No nodes palpable.

No nodes palpable.



Circulatory System.

Dyspnoea. She has slight breathlessness on exercise.

Palpitations.

None.

Pain. No pain in the praecordial region.

Faintness. No faintness.

Arteries.

Pulse. On admission it was 82 per minute.

Rhythm. Steady.

Force. Strong.

Systolic. Above Average.

Diastolic. Above Average.

Nature of the vessel wall. Palpable.

Nature of the pulse wave. Regular but sharp.

Blood Pressure.

By use of the Sphygmomanometer:-

Systolic Pressure. 160mms. Hg.

Diastolic Pressure. 100mms. Hg.

Veins. No abnormality.

Capillaries.

There is no cyanosis, or dropsy.

Heart.

Form of the Praecordium.

No abnormalities.

Pulsations.

None either in the Epigastrium, upper part of the Sternum, or in the Neck.

Palpation.

The apex beat could not be localised easily as it appeared to be diffuse. It did not appear to be pushed out.

Percussion.

On percussion the heart showed no enlargement

Auscultation.

Mitral. All the heart sounds are easily

Tricuspid. heard and are quite normal.

Aortic. There are no murmurs present.

Pulmonary.

Rate of the Heart. Average.

Rhythm. Regular.

The pulse is present.

Alimentary System.

Appetite. Her appetite was good.
Thirst. None.
Dysphagia. No difficulty in swallowing.
Pain. None.
Feeling of weight. None.
Distension. None.
Flatulence. None.
Heartburn, Waterbrash, and Nausea. None.
Vomiting. None.
Action of the Bowels. These are regular. She has a bowel motion every day.

Signs.

Lips. They are reddish in colour, and moist.
Tongue. It is reddish in colour, and rough. It is moist.
No tremor present.
Teeth. False.

Abdomen. General.

The abdomen is very obese, and is very flaccid.
Striae gravidarum are very prominent. It moves well on respiration. Movements are equal.

Palpation. This shows a well covered fatty abdomen. No other abnormality is found.

Percussion. No abnormality.

Rectal Examination. Negative.

Liver. Not enlarged.

Urinary System.

There is no pain in any part.

Micturition.

No frequency or pain.

Kidneys. Not palpable.

Urine. Nothing abnormal discovered.

Respiratory System.

Cough. No cough.
Expectoration. None present.
Haemoptysis. None.
Breathlessness. Slight on exercise.
Pain. None.

Signs.

Breathing.

Rate. This is on the average 20 per minute.
Type. Thoraco-abdominal.
Rhythm. Regular.

Sputum. None.

Thorax.

Inspection.

The chest is very well covered with fat. The breasts covering the main part anteriorly. There is a tendency towards roundness. There are no local or general departures from the normal, excluding the breasts.

Palpation. Movements are equal, and of a very good expansion. Vocal Fremitus is equal on both sides.

Percussion.

Equal, and resonant in all areas, and on both sides.

Auscultation.

Breathsounds. Normal. Vesicular.

Accompaniments. None.

Vocal Resonance. Equal on both sides.

Haemopoietic System.

The glands in the groin are enlarged but not above normal. Two glands can be palpated in the left supra-clavicular region.

Spleen.

It could not be palpated.

No blood or bacteriological tests done.

Nervous System.

Mental Function.

Good. There are no abnormalities.

Cranial Nerves.

No abnormality. Some proptosis of the left eye present.

Reflexes.

Superficial.

Abdominal. Present.

Plantor. Present.

Deep.

Knee. Present on both sides, and equal

Ankle. Present on both sides, and equal

Endocrine System.

Pancreas. Nothing abnormal discovered. Urine- Sugar free.

Thyroid. It is of average size, and consistence. There are no pulsations. No symptoms of an abnormal Thyroid.

Parathyroid. There is no Tetany present, and no signs of changes in the bones.

Suprarenals. There is no pigmentation of the skin, and no symptoms or the signs connected to the Suprarenals.

Pituitary. There are no skeletal changes, and no changes in sex character.

Gonads. There are no abnormalities.

Integumentary System.

Nothing abnormal discovered.

Locomotory System.

Bones.

Joints. Nothing abnormal discovered.

Muscles.

Reproductive System. No abnormality. Menopause early.

From the history and examination a diagnosis of a fairly advanced Neoplasm of the breast was made. It was decided to carry out a Conservative Mastectomy, and give a course of Radiotherapy after it, owing to the patient having the already diagnosed and treated neoplasm of the left antrum.

Pre-operative Treatment.

Nil.

Operation.

Premedication.

Omnopon. gr. I/6.

Atropine. gr. I/100.

By subcutaneous injection.

Operation.

24th. May, 1948.

Surgeon. Mr. R. L. Stewart.

Anaesthetic. Gas, Oxygen, Ether.

Nature of the Operation. ' Conservative Mastectomy.'

An elliptical incision was made round the breast. The tissues were divided down to the pectoral fascia, but excluding it. Haemostasis was secured with diathermy. The mammary tissue was removed, and it was noted that the tissues were rather tough to cut medially, where it seemed that peau d'orange was present.

The wound was closed with interrupted, and continuous silkworm gut, and a rubber dam drain was inserted into the wound, and a rubber tube drain was inserted through a separate stab wound.

Progress after the Operation.

The patient recovered satisfactorily after the operation.

26th. May, 1948.

She was making good progress. The superficial drain was removed.

28th. May, 1948.

The patient's progress was very good, and she was allowed up.

29th. May, 1948.

The rubber tube drain was removed.

2nd. June, 1948.

The stitches were removed today. She had developed a little fluid collection deep to the scar, which was aspirated, as such a collection of fluid reduces the irradiation tolerance of the skin.

8th. June, 1948 - 28th. June, 1948.

The patient had X-ray therapy during these dates. The left breast area, left axilla, and left supra-clavicular region being irradiated. The minimal tumour dose was 3300r. She was also given ovarian radiation.

28th. June, 1948.

The patient was discharged home. She was asked to return in a month.

14th. June, 1948.

The patient was satisfactory.

10th. November, 1948.

The patient appeared well. It was noted that there was some thickening towards the lower end of the scar, and also in the pectoral line above. It is suspicious but may be just fibrous tissue.

Pathological Report.

Received. 23rd. May, 1948.

Issued. 31st. May, 1948.

Nature of Specimen. ' Breast. '

Macroscopic.

A carcinoma is present in the breast with its centre thirteen centimetres from the nipple. It is ovoid, measuring six point five by five centimetres, and consists of firm, pale, brownish grey, somewhat translucent tissue, marked by many minute, opaque, yellow areas of necrosis, and occasional haemorrhagic points. The growth has bulged, and attenuated, and discoloured the skin, but is covered inferiorly by abundant fat. No enlarged glands are attached to the specimen.

Microscopic.

The fibro-fatty tissues of the breast have been invaded by a solid alveolar, spheroidal cell carcinoma accompanied by slight focal necrosis, moderate fibrous overgrowth, and a good deal of chronic inflammatory infiltration.

Differential Diagnosis.

The differential diagnosis in a case of Carcinoma of the Breast includes the following diseases:-

- Diffuse Hypertrophy.
- Fat Necrosis.
- Haematoma.
- Cysts of the Breast.
- Acute Abscess.
- Chronic Mastitis.
- Mastitis Obliterans.
- Actinomycosis of the Breast.
- Syphilis of the Breast.
- Tuberculosis of the Breast.
- Simple tumours of the Breast.
- Carcinoma of the Breast.
- Sarcoma of the Breast.
- Paget's Disease.
- Bone tumour lying below the Breast.

Diffuse Hypertrophy.

In this condition the breasts usually increase in size by an increase of their fibro-stroma. The condition is usually bilateral when it is present. The breasts become pendulous, darkly cyanosed, and covered with distended veins. The picture may suggest the presence of a tumour growth. However the disease is a rare condition, and occurs at the time of puberty, which would rule it out in this case.

Fat Necrosis.

This is a condition where usually after trauma, especially of a severe nature, saponification occurs in an area of breast fat. This area is soon invaded by cells and becomes walled off by an area of dense fibrous tissue. A swelling is thus made, and is hard, and often painless. There may be a 'peau d'orange' effect. The swelling is often attached to the underlying tissues. The patient gave no history of a recent injury, and had noticed the skin change for a long time. Though the breast showed the presence of 'peau d'orange' it also showed discoloration, and also a little nipple retraction. This condition was ruled out by the pathological report.

Haematoma.

This condition occurs after an injury to the breast. It should really be included under cysts of the breast, but I think better to be taken separate. It consists of a small collection of old blood or serum surrounded by a fibrous wall. There is considerable bruising of the breast usually, and it is tender, and a fluctuating swelling may be palpated. The patient gave no history of any injury. The swelling was firm in nature, and did not fluctuate and was superficially adherent. There was also nipple retraction, and skin changes not suggestive of bruising.

Cysts of the Breast.

This includes the other cysts, excluding that one already mentioned. The main ones to be made out in this section are a Galactocoele, and Hydatid cysts. The others are sebaceous, serous, dermoid.

A galactocoele appears during lactation, and consists of a smooth rounded, painless swelling close to the areola. The nipple is not retracted, and the swelling is freely movable. It may be tense or fluctuant. The patient was not lactating, and the swelling was at a distance from the areola.

Hydatid cysts are very rare, and if present would also show signs in other parts of the body.

Involution cysts are cysts appearing about the menopause, and are probably associated with chronic mastitis. They are multiple and usually very tense. They form smooth, round uniform swellings attached to the remainder of the breast tissue, but independent of the skin and pectoral muscle. The patient showed a firm tumour, which was attached to the skin, and also showed skin changes. The pathological report ruled this condition out. The patient was also well passed the menopause.

Serous cysts are thought to be due to dilatation of lymph spaces. Usually multilocular, and are surrounded by a wall of fibrous tissue. They are painless and fluctuate. Sometimes the overlying skin becomes thin and bluish. The patient's tumour did not fluctuate, and the skin changes were definite.

Acute Abscess.

In this condition the breast is usually congested, inflamed, and tender to the touch. There is usually the history of the inflammatory condition and then the formation of the lump, which is tender. Fluctuation may be present. The abscess may arise retro-mammary and pass into the breast. There are features of an acute systemic upset present too. The patient gave no history of inflammation, and her lump in the breast was only discovered by chance.

Chronic Mastitis.

This condition occurs in women of all ages. In women beyond middle-age it is seldom extensive. It occurs both in multiparous and in nulliparous women. The breast may be enlarged or shrunken, a diffuse shotty sensation is characteristic. Both breasts may be affected. Often an indurated or rubbery consistence is found, and cysts if present, on palpation are felt as tense but not hard swellings. In the more localized forms an irregular nodular swelling may be mistaken for cancer. There may be a discharge from the nipple, and it varies in type, being blood-stained, yellow, brown, etc.. The nipple may be retracted sometimes. The axillary glands may be enlarged, but they will not be hard and they are frequently tender. There is no fixation of the breast to the nipple or to the deeper structures.

We have thus a condition which could resemble the patient's trouble. The patient had noticed that the skin was becoming thickened, and that there was the prescence of colour changes in the skin. On examination a lump was found. This lump however appeared to be fairly definite though its edges were not exactly apparent as they faded into the surrounding tissues. Thus so far I think it could be a chronic mastitis. However we also have some nipple retraction, which does not count very much, but also the tumour was adherent to the skin surface. There was also present peau d'orange which does not appear in chronic mastitis. In an early case it might be very difficult to distinguish the two types, and it would have to be done by a biopsy.

Mastitis Obliterans.

This condition appears to take the form of a unilateral painless tumour in parous women. There may be a mild inflammation during its development. It is not often tender, and is often adherent to the skin, and shows peau d'orange. The nipple is sometimes retracted. This story is close to the picture as shown by the patient in the case. The pathological picture of mastitis obliterans, however differs. In it when the swelling is cut, a yellowish-brown discoloration is seen, often with abscess formation. The normal duct epithelium is replaced with granulation tissue. In the report issued on the specimen of the breast of the patient, we find that the tumour was of a firm, pale, brownish-grey, and somewhat translucent, and showed areas of necrosis. Microscopically it was however a spheroidal cell mass of tissue.

Actinomycosis.

This condition is of two kinds. The first is the primary, and is very rare indeed. The second type is that which is secondary to actinomycosis of other parts of the body, which the patient showed no symptoms or signs of having.

Syphilis.

This may occur in any of the three stages of general syphilis. In the first stage it shows itself as a chancre of the nipple. In the second stage condylomata may form in the thoracico-mammary fold. In the third stage there are three kinds. The first is a diffuse fibrosis, the second is small multiple gummata, while the third is a solitary gumma, which is a hard mass invading the skin to give a typical syphilitic ulcer. The Wasserman is usually positive in the secondary and tertiary stages. The patient even though she had had the skin changes for a long time and also the growth, did not show any signs of ulceration. The Wasserman reaction was not done on the patient.

Tuberculosis.

The condition is divided into primary and secondary. The primary is a very rare condition. the secondary is divided into several types. The first is the nodular tuberculous mastitis. Here a few closely grouped tubercles form an ill-defined tumour. It does not adhere to the muscles. Through time it breaks down and discharges through the skin. The patient did not show the presence of tuberculosis in other parts of the body. The tumour did not give the appearance of breaking down, and there was also the presence of peau d'orange. The other types are confluent mastitis where the scattered tubercles caseate and form little abscesses. The third type is a sclerosing tuberculous mastitis, which is a dense localized fibrosis. It may retract the nipple. It may simulate a tumour growth. It also adheres to the skin. The patient however as already stated did not show signs of tuberculosis, and the condition can be finally ruled out by the pathological report. The fourth and final is the obliterating tuberculous mastitis is a very rare condition and causes an epithelial proliferation of the ducts and fibrosis around them.

Simple tumours of the Breast.

These are of two groups. The first is the Fibro-adenoma. This group is divided into two parts. The first is the Pericanalicular fibro-adenoma. It occurs usually in unmarried women between twenty to thirty years of age. The tumour is firm, well-defined, and freely movable. The last two points being opposite to what was found in the case. The second is the Intracanalicular fibro-adenoma. It usually occurs between the ages of thirty to fifty. It is soft, well-defined, and freely movable, which are again opposite to the tumour of the patient. The second group is the Benign Duct Papilloma. This tumour usually starts about the menopause. It arises near the nipple, and is not very mobile, the nipple frequently indrawn, and a discharge present. The patient's tumour was at a distance from the nipple and though the nipple was retracted there was no discharge. The tumour was not movable and there was the presence of skin changes.

Carcinoma of the Breast.

This condition usually occurs between the ages of thirty-five to sixty. The features of a case depend at what stage the tumour is found. At first the complaint is that there is a lump in the breast. Later the patient may begin to have pain in the arm, which is usually of a dull nature. The patient may complain that the lump is getting bigger, or that there has been a discharge from the nipple. She may have noticed that there are changes in the surrounding skin. The patient may complain of secondary results from the tumour growth, such as swelling of the arm, or if the spread has taken place to other organs, pain from these or respiratory trouble if they have been to the lungs.

At first on examination the lump is felt in the breast tissue itself. It is easily defined and stony hard, and its edge is indistinct. Later the skin becomes adherent, while the nipple may be retracted or may be even elevated. The skin may show *Peau d'orange* or *Cancer en Guirasse*. The lymph nodes in the axilla may be palpated and appear hard to the touch. On other examinations the signs of metastases may be made out, such as by x-ray of the chest. There are various types of tumour of the breast of carcinomatous form. The Scirrhus type is the commonest, and is a hard tumour with an irregular edge. The Atrophic scirrhus is commonest in old people. The Acute, Medullary or Encephaloid growth is a highly malignant tumour of duct origin. It is commonest at the early age periods. Mucoid carcinoma is a low malignant growth. The term Adenocarcinoma is a term used for tumours showing a well-marked glandular arrangement. Duct carcinoma are usually the result of a simple duct papilloma undergoing malignant change.

The patient stated that she had had the thickening of the skin for some years, though she did not appear to have noticed any lump. It was only by chance that the lump was observed. This lump was firm and though it tended to be circular, its border could not be properly palpated. It was fixed in position. The skin above it was adherent to it, and showed colour changes as well as *peau d'orange*. No glands were palpable which were referable to the tumour, and no signs of other organs being affected were found. On the firmness of the lump, its position, in the upper, and outer quadrant of the breast, its fixity to the skin and the changes in the skin, we can assume that it is a carcinoma of the breast. This tumour would appear to fit into the Scirrhus, Atrophic Scirrhus, or Adenocarcinoma type, though probably the Scirrhus type. This type is suggested by the pathological report on the specimen of tumour examined.

Sarcoma of the Breast.

It is a rare tumour, and may occur at any age usually between thirty to fifty years. It is usually a hard, circumscribed, freely movable swelling of rapid growth. The patient gave a long history, and it would appear that the growth was very slow.

Paget's disease.

This condition is characterised by the association of an eczema of the nipple and the presence of an underlying tumour. There is doubt as to which appears first. There is a desquamation of the epithelium of the nipple with a serous discharge. An ulcer forms, which is at first small, but gradually spreads and destroys the nipple and areola. The disease is slow, but ultimately a typical cancerous ulcer and glandular metastases develop.

Bone tumour underlying the Breast.

Tumours in this position are rare, and would be fixed to the rib, and would be felt that they were not in the substance of the breast tissue itself.

X-ray may help to differentiate.

Discussion.

This patient, Mrs. Christina Meldrum, sixty-nine years of age, first reported at Wards 5 and 6, of the Royal Infirmary, as an out-patient.

She had been an in-patient in the Wards of the Ear, Nose, and Throat, department, where she had received treatment for a very extensive tumour, diagnosed as a squamous epithelioma of the Left Antrum. She had responded well to treatment, which consisted of Radiotherapy, though two glands were still present in the left supra-clavicular region.

While being examined there, they had observed the presence of a mass in her left breast, and had decided to send her for surgical treatment if possible. On examination of the breast at out-patients, it was decided to admit the patient. She was admitted to Ward 5, on the 22nd. May, 1949.

The patient that for many years she had felt a thickening of the skin in the left breast, but she never bothered about it, as thirty-seven years ago she had had an abscess incised in this area, caused by the irritation of carrying coal during a strike. She did not complain of any pain at all. On one occasion she had developed a twitching of her arm. She stated that she felt quite well now, her appetite being good. Her bowels were regular, and she had no trouble with her urine, and her weight was steady.

General examination showed her to be a well built, though stout person, rather plethoric in appearance. Some proptosis of the left eye was obvious.

The Breast examination showed both breasts to be very pendulous, the left one having a rash known as 'Peau d'orange' on it, and also some nipple retraction. On palpation a tender, large tumour, which was adherent to a blackened skin could be palpated. No enlarged lymph nodes could be palpated.

From the history, and examination a diagnosis was made of neoplasm of the breast, and it was decided to do a "Conservative Mastectomy", and apply Radiotherapy, after the operation.

This operation was carried out on the 24th. May, 1948, by Mr. R.L. Stewart, using Gas, Oxygen, and Cyclopropane as the anaesthetic.

The patient withstood the operation very well, and on the 8th. June, 1948, to the 28th. June, 1948, she received X-ray therapy in the left breast area, left axilla, and the left supra-clavicular region. The minimal tumour dose was 3300r. Radiation was also applied to the ovaries.

The pathological report issued on the 31st. May, 1948, showed the lump to be a solid, alveolar, spheroidal cell carcinoma, accompanied by slight focal necrosis, and a good deal of chronic inflammatory change.

The patient made excellent progress after discharge, though reporting back on the 10th. November, 1948, it was noted that towards the end of the scar, there was some thickening which was suspicious, but may have been just fibrous change. The patient herself stated that she was feeling quite well.

Anatomy of the Breast.

This includes the Mammary Gland itself, the superficial fascia, which encloses it, but the overlying skin with the nipple and the areola.

The gland is ectodermal in origin, and arises as fifteen to twenty solid epithelial ingrowths. Their deeper portions divide, subdivide, and proliferate to form the lobules of the gland, while the original stem ingrowths become canaliculised to form the lactiferous ducts which open into the nipple.

The nipple is transversed by these ducts, and forms a small conical projection usually placed over the fourth intercostal space. Its base is surrounded by a circular area of pigmented skin, the areola. It is pinkish in the virgin, but becomes darker during the first pregnancy, and remains thus.

The gland itself is small in the child, and the enlargement which occurs in the young female at puberty affects the parenchyma only, while the glandular tissue itself proliferates when the gland increases in size during the first pregnancy. Its maximum size being reached during lactation.

The Mammary Gland is hemispherical in shape, and extends from the second costal cartilage to the sixth costal cartilage, and from the edges of the sternum almost to the middle of the axilla. A process termed the "axillary tail" curls round the lower border of the pectoralis major, and comes into close relationship with the axillary vessels.

The gland lies in the superficial fascia on pectoralis major, serratus anterior, and the upper part of external oblique, and its aponeurosis. The blood supply is from the external mammary branches of the lateral thoracic, the intercostals, and branches of the internal mammary arteries. The venous drainage ending in the internal mammary, and axillary veins, and a few ending in the external jugular vein. The nerve supply is from the fourth, fifth, and sixth intercostal nerves.

The lymph vessels of the breast are numerous, and drain to a wide field, thus increasing the dangers of malignant spread from it.

There is a superficial plexus of lymph vessels, which lies under the skin, superficial to the gland. It receives afferents from the gland and sends its efferents, some to the pectoral glands, some to the infra-clavicular lymph glands, and others to the deep or mammary plexus of lymph vessels, which is closely related to the deep fascia on which the mammary gland rests. In addition the deep plexus receives directly, most of the lymph vessels of the gland.

The efferents of the deep plexus pass to:-

- I. The pectoral lymph glands.)
- II. The subscapular lymph glands.)
-) from these efferents pass to the lateral axillary, and apical lymph glands.
- III. The infra-clavicular lymph glands, and thence, via the apical glands, to the postero-inferior group of the deep cervical glands.
- IV. To the lymph glands along the internal mammary vessels, and thence to the mediastinal lymph glands.
- V. To the sub-diaphragmatic plexus, crossing the costal margin, and piercing the abdominal wall.
- VI. Communicating with the deep plexus of the opposite side.

Carcinoma of the female breast is one of the commonest forms of malignant disease. It is found that nearly three-quarters of all the tumours of the breast are carcinomatous, the only other organ in the body to compare with it is the uterus.

The disease is almost limited to women, and less than one per cent occurs in men. It appears commonly between the ages of forty and sixty, but cases at an earlier age, or even later are not uncommon. A tumour has been known to arise at the early age of seventeen, and this case is itself an example of it occurring at a late age, though as to its exact start in this case it is difficult to say, as it would appear to have been in a recognisable state for some time.

Aetiology.

It usually occurs in the years just before the menopause, i.e. the involution period. There is a higher incidence in nulliparae than in multiparae, owing perhaps to the frequency of chronic mastitis in the former. The disease appears to bear no relation to repeated suckling, and pregnancy, which indeed seems to have a protective influence.

The cause of the disease is uncertain, though in this type of growth we are very close to the hormonal control of the body.

When experimental research was done on animals, there were three factors that appeared to stand out. Inadequate drainage of the duct system with retention of irritating material. (Adair et al.). This breast drainage can be interfered with easily, as a result of abnormalities in the duct system.

Adair states that only a small number of patients with neoplasm of the breast, will tell of a normal nursing history.

By use of mice, whose incidence to cancer of the breast was low, it was found that if the ducts to the nipples were ligated, the carcinoma frequently appeared halfway through a pregnancy. This rather supports the theory of the products provided in the breast being held up. The theory of irritation has been accepted as a general factor for causation of any tumour growth, in any part of the body. The second factor was put forward by Lacassagne, and he stated that irregular, or abnormal ovarian stimulation was probably the reason. This has been shown experimentally that the injection of oestrogen, will produce mammary cancer, in mice in a high percentage of cases. In mice who have been proved to be very susceptible to the occurrence of mammary cancer, if they have their ovaries removed when young, appear to lose their susceptibility to the development of this growth.

The fault may however not lie in the ovaries themselves, but in other glands of the body, and when the ovaries are removed the chain necessary for the transmittance of the cause is broken.

It has been observed by Greene that in some cases of mammary cancer, that there is also present an adrenal hyperplasia.

In regard to the effect of female sex hormones, there has lately occurred a case, where a woman who was receiving stilboestrol developed a mammary growth. (British Medical Journal). There is however no proof to support the statement that the stilboestrol was the cause, but the doubt is however present.

The third factor is that some maternal influence is transmitted with the mother's milk. (Bittner). He thinks that some extrachromosomal influence may be transmitted in the mother's milk.

In support of his statement he has shown experimentally that if the young of a high breast tumour stock are suckled by mothers of a low breast tumour stock, the incidence of breast cancer is greatly reduced. He has even succeeded in extracting this factor, and when given to mice with a low incidence, it has increased there incidence considerably.

It is stated by some people that trauma and external irritation play no part in mammary cancer. They think that as trauma is such a common occurrence to the breast, that if it played a part more cases of mammary cancer would occur. This is perhaps true in a way, but in the present case the patient developed an abscess due to irritation caused by carrying coals. The present tumour growth has appeared in the same area. Perhaps the trauma and irritation were not a direct cause, but I do think that they can be treated as secondary factors.

The question of hereditary predisposition to this disease is continually being raised, but there is probably no evidence of any such tendency, although occasionally striking family histories will be encountered.

There appeared to be no hereditary predisposition in this case, but one important fact I think does stand out. Before she came to wards 5 and 6, she was already receiving treatment for a neoplasm of her left antrum. Thus perhaps she had a weakness, or perhaps a loss of cancer immunity in the cells of her body to the formation of tumour growth.

Lately there has appeared a report by Dr. A.M. Begg (Lancet, April, 1948), that he had found an effective means of inducing mammary cancer in suitable mice by intranasal instillation of small particles, similar to those found in tumour growths, from the electron microscope studies of milk from the stomachs of mice. These particles may tend to support the theory of Bittner already mentioned. A virus as the causation has been suggested, and benign tumours of the body have been produced by them. Perhaps it is a virus which is transmitted in the milk, and is passed to the breasts of the mice in Dr. Begg's experiment of intranasal instillation.

Pathology.

The great majority of cases of carcinoma of the breast can be placed in one of six groups:-

1. Scirrhus carcinoma.
2. Medullary carcinoma.

3. Adenocarcinoma.
4. Duct carcinoma.
5. Mucoid carcinoma.
6. Paget's disease.

If the tumour can not be placed in one of these groups it may be called anaplastic in type.

The scirrhus type is much the commonest form of cancer of the breast, and usually occurs in women between the ages of thirty-five to sixty-five.

The growth is usually situated in the upper and outer quadrant of the breast. It usually arises in the substance of the gland fairly close to the nipple, but occasionally an outlying lobule is affected first. Very rarely are both breasts found to be affected. It becomes fixed to the deep fascia, and later to the skin, but if the growth occurs midway between fascia and skin the tumour thus remains freely movable for some time. Fixation and retraction of the nipple occur late and is caused by involvement of the large milk ducts.

This type of tumour grows relatively slowly but however dissemination is an early occurrence.

The lesion is circumscribed, although not encapsulated as processes pass into the surrounding tissue. The tumour is very hard, and feels gritty on being cut.

It is fibrous, light grey in colour. Scattered through the tumour there are often pale fibrous streaks and pin-head yellow spots of necrotic epithelial tissue, so that the appearance is compared to the surface of an unripe pear.

On microscopic examination, the tumour consists of masses of epithelial cells separated by a dense, and abundant fibrous stroma. The tumour originates from the epithelial lining of a duct, but the normal glandular structure soon disappears. The cells are spheroidal and distorted in shape by the fibrous stroma, though they may become more obvious towards the periphery.

The atrophic scirrhus carcinoma is an extreme variety of the ordinary form. It usually occurs in women over the age of sixty-five, and is of a very slow growth, and of low malignancy. The tumour is small and very hard. Microscopically there are very small islands of spheroidal epithelial cells embedded in dense fibrous tissue.

The medullary carcinoma is a much less common growth. It occurs typically in the well-developed breasts of younger women. It has the same essential nature as the scirrhus type. It forms a soft mass, and infiltrates widely, rapidly, and dissemination also occurs quickly. This type does not form the rather early adhesions with the deep fascia, and skin which is characteristic of the scirrhus type.

It is of a spongy texture, and haemorrhages and large areas of necrosis are common. On microscopic examination it is highly cellular, and has very little stroma. The epithelial cells are spheroidal or sometimes almost columnar, and may show evidence of rapid division.

The acute carcinoma of pregnancy and lactation is an extreme form of this type. It is very malignant, and its course may only be a few months. This tumour is highly vascular, and histologically the epithelial cells show every sign of extreme malignancy. The anaplasia may be so great that it resembles a sarcoma.

Adenocarcinoma is a rare breast tumour. This term adenocarcinoma was used by Halstead to describe mammary tumour containing large tubular spaces lined with many layers of epithelial cells. It is however now generally applied to a tumour in which the cells are not entirely arranged in solid masses, but exhibit in places a glandular arrangement.

In most cases a tumour of this class approximates to a localised form of intraductal malignant hyperplasia, and is consequently of low-grade malignancy. It is of soft consistence and may become quite bulky, and remains localised for a long time. It may finally cause ulceration of the skin, and form a large fungating tumour on the surface. The microscopical appearance is that of gland spaces surrounded by columnar epithelium.

The duct carcinoma usually arises from one of the large ducts near the nipple. The growth may originate from a duct papilloma. Owing to fusion of the papillary processes a gland like condition may be found, so that the lesion has been called cyst-adenocarcinoma.

On microscopic section it is usually found to consist of one or more papilliferous nodules growing within the lumen of a large dilated duct from the wall of the duct, and covered with columnar epithelium, which exhibits a malignant tendency to break through its basement membrane and invade the surrounding structures. From the clinical point of view the condition is not very malignant. It very slowly and sooner or later becomes attached to the skin, which ultimately will become red, and dusky, and may even give way and ulcerate.

The mucoid carcinoma is usually regarded as a mammary carcinoma which has undergone mucoid degeneration. A large area or even the whole tumour may be affected. They are usually bulky and of soft consistency, and when cut the tumour is composed mainly of soft, jelly-like material, yellow or red in colour, often collected in cyst-like spaces. Odd streaks of solid tumour may be seen. The mucoid material is a product of the malignant epithelial cells. At first it lies within the cells, which as a consequence become distended to signet-ring shape. Later the mucoid material is set free in the intercellular stroma.

Paget's disease is a disease of the breast that can be classed as a debatable carcinoma. Sir James Paget described it as a chronic eczema of the nipple with the development after some years of a cancer of the breast.

There is a great difference of opinion as to whether the skin condition or the cancer was the primary lesion. The skin lesion itself is malignant. The eczematous area at the nipple is usually bright red, and either moist and weeping or dry and scaly. The most characteristic feature, microscopically, is that of large, clear, vacuolating cells, with small pyknotic nuclei called Paget's cells.

Muir and others believe it to begin as an intraduct carcinoma, and spreads along the duct to the epidermis.

Some cases show no connection between the skin lesion and the underlying carcinoma. In these cases Cheate suggests that the carcinogenic agent has acted on both the epidermis and on the breast tissue at a distance. The carcinoma associated with it is usually of a typical scirrhus type.

The spread of any of these tumour growths is by one of three ways:-

1. Infiltration.
2. Lymph stream.
3. Blood stream.

Infiltration is the manner in which the tumour cells spread directly through the breast tissue. They infiltrate the tissue spaces between the fat cells and connective tissue bundles, and it is in this way that the deep fascia, and the skin layer become affected. The skin layer may become affected in four different ways altogether.

It will be affected directly if the tumour growth is situated superficially and the overlying skin becomes thin and later ulcerates.

The skin may become involved by multiple metastatic nodules around the tumour. These are thought to result from invasion of the skin from below, by cells derived from the growing edge of the annular zone of permeation along the deep fascia.

Peau d'orange is an affection of the skin, which was observed in this very case, where the skin becomes tense, thickened and oedematous from obstruction of deep lymphatic channels by the malignant growth, and the tiny depressions that mark the site of hair follicles, and sweat glands give the appearance of orange peel.

Cancer en Quirasse, or Cancerous Pachydermia, is a curious condition of the skin, occurring late in the disease. The first change is a retraction of the skin immediately superficial to the growth which becomes fixed, and indurated. This change may progress to affect the whole or part of the thoracic and abdominal skin surfaces. The arm in relation to the affected breast may become affected. The skin affected is at first thick, and oedematous, and pits on pressure, but later becomes shrunken and tough, and hard as leather. Often secondary cancerous nodules are scattered over the skin. It is believed to be caused by a widespread infiltration of the skin by a very scirrhus growth, while others class it as secondary to the oedema of lymphatic obstruction.

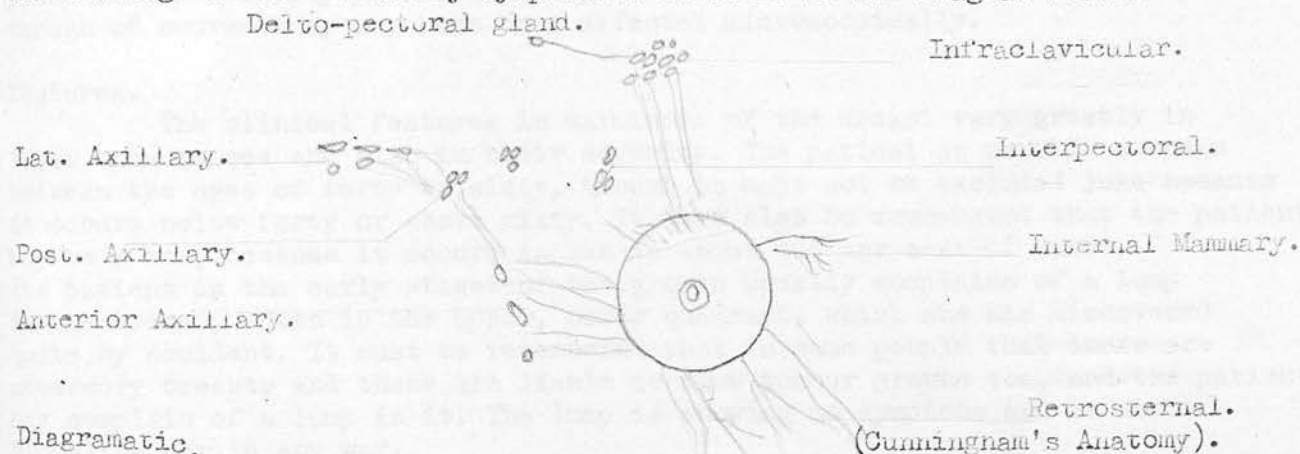
The spread by lymph vessels is the most important route for dissemination of cancer of the breast.

There are two ways in which the growth may travel by lymphatics. Sampson Handley thinks that the growth permeates along the lymphatics and the tail of the group of cells die, while the cells at the head multiply to increase and cover the distance.

They may be carried as tumour emboli in the lymph stream, and this is regarded as the more important of the two methods.

The axillary nodes are affected early, especially in the scirrhus type. If the mediastinal nodes become affected it is a late occurrence and surgery is regarded as useless.

The drainage of the breast by lymphatics is shown in the diagram below.



The plexus of lymphatics which lie upon the deep fascia becomes filled with the tumour cells. and it is along the planes of deep fascia and the muscular aponeuroses that the principle spread takes place, the pleural and peritoneal cavities perhaps being affected. The lung may be invaded from the bronchial lymph nodes, and the liver by way of the lymphatics in the falciform ligament. Distant organs are involved more by blood spread, and Schmidt showed that such emboli can be shown frequently in the pulmonary vessels at the time of death. The spread may occur to the lungs, liver, spleen, etc. The occurrence in the spleen is rare as it seems to be able to resist tumour growth, but it does occur in breast cancer.

Dissemination to the bones occur most frequently in the vertebral column, and next in the upper ends of the humerus and femur. Handley claimed that these secondaries were due to lymph vascular permeation, but Piney disbelieves this, as the parts of the bone affected are the parts of the bone containing the red marrow, and blood borne cells grow very readily in this area.

Unusual metastatic manifestations sometimes occur. Lymph nodes in the pre-auricular region have been reported to have been affected, and also the parotid gland, which simulated a parotid gland tumour at first. Even the mandible has been affected. (American Annals of Surgery).

From the pathological report on the specimen of breast and tumour tissue in the case we find from the macroscopic picture, that the tumour is brownish-grey, and has some areas of necrosis, while the microscopic picture shows solid alveolar, spheroidal cell carcinoma, with moderate fibrous overgrowth.

This tumour would tend to fit in with a scirrhus type of growth, but it is not actually the true variety.

It became attached to the first and not to the deep layer, and though it would appear to have been present for some time, and also from its microscopic picture, dissemination except to the skin, does not appear to have taken place to other nearby parts, as the glands in the axilla could not be palpated, though of course they may have been affected microscopically.

Features.

The clinical features in carcinoma of the breast vary greatly in their occurrences and also in their severity. The patient is usually a woman between the ages of forty to sixty, though it must not be excluded just because it occurs below forty or above sixty. It must also be remembered that the patient may be a man, because it occurs in man in about one per cent of cases. The patient in the early stages of the growth usually complains of a lump in the breast, often in the upper, outer quadrant, which she has discovered quite by accident. It must be remembered that in some people that there are accessory breasts and these are liable to show tumour growth too, and the patient may complain of a lump in it. The lump is showing no symptoms and is not troubling her in any way.

As the tumour advances both in size or malignancy, the patient may come complaining of certain different factors. She may have discovered a lump in her breast some months previously, which has grown larger, and she has decided that it is necessary to see about it. On the other hand the patient may complain of a dull aching pain usually in the breast, which at times appears to pass up to the shoulder, and may pass down the arm. Here it is only on examination that a lump is discovered in the breast. About this time there may be a skin involvement by the tumour or if it is superficial, with perhaps ulceration or other marked changes in the skin, which draw the attention of the patient to the breast. The next stage in the history may be that the patient has had trouble with her arms. This is usually due to enlargement of the axillary nodes. Due to this enlargement they may press on the nerves or blood vessels, passing through the axilla, and produces symptoms referable to them, such as neuritic pains in the arms, or oedema of the arm. Usually however by the time the patient has come complaining of these symptoms, she is also complaining of the breast.

If a patient however does not come till her tumour is far advanced, the symptoms are usually of those connected to secondaries in other organs, though again trouble with the breast is usually obvious. The secondaries may be in the mediastinum, or pulmonary, and here the patient complains of an intractable cough or symptoms of a pleural effusion. Spinal secondaries are common, and the patient complains of an intense pain of girdle character, though the symptoms may be referable to that of paraplegia if pressure on the cord occurs.

The secondaries may pass to the abdomen, and if the liver is affected, it may become an obvious swelling or the abdomen may become swollen due to the presence of ascites. Osseous metastases may cause fractures of the bones affected.

Other complaints may be made by the patient and these include perhaps a discharge from the nipple. This may be purulent or more often blood stained, and usually occurs in tumours of the duct type. Ulceration of the breast with a purulent discharge occurs sometimes in the late stages of carcinoma of the breast. Often the patient only complains of loss of weight, and or a general debility, when the tumour is in a late stage.

After the present history it is necessary to include the past history as it may give a clue as to perhaps the origin of the growth. She may give a history of some past injury to that part of the breast, such as an abscess, or a blow of some sort, but many times, there is no possible explanation.

In a survey by the British Empire Cancer Campaign on 2529 cases of cancer of the breast it was found that a lump in the breast was the first complaint in 17.4% of patients, pain was the first complaint in 11.6%, discharge from the nipple in 2.2%, and symptoms due to metastases in 1.6%. This shows that the commonest symptom is that of 'just a large lump in the breast' without other symptoms, and may or may not be discovered by the patient.

In this report also it tells us that 44.1% consulted their doctor within three months of noticing the first symptoms, and 15.3% within the next three months, and in 33.3% the symptoms were of more than six months duration before advice was sought. Here we must note that nearly a third, i.e. about eight hundred odd cases alone, had lost a lot of valuable time before this disease was discovered. (Lancet March, 1949).

We must now come to the examination of the patient. The first examination is that of the general appearance of the patient, and is followed by the examination of the breasts. Certain procedures are carried out in this part of the examination. The patient is stripped to the waist or further if it is necessary for a clear area for examination around the breasts. The patient may sit upright in a bed with the back against a pillow, or better still on a stiff-backed chair. The patient should also be placed in a good light, which covers her equally, and without any shadows passing over the area.

The first part of the examination is that of inspection, and is carried out by inspecting the breasts from the front. The size of the breasts are noted. One breast may be larger than the other, and thus cover a larger area. The level that the breasts hang to should be observed though sometimes the left breast normally hangs lower than the right. The skin of the breasts should be examined next. It may be red and inflamed looking, and if so it is necessary to find out if the patient has been applying drugs to the area. If not the redness may be a sign of inflammation.

The skin may be bluish in colour, or even blackish if there is a history of a blow to that area. Actual ulceration of the skin may be observed, and also the signs of *peau d'orange* or *cancer en cuirasse* present. These have been explained in the pathology of the disease. Any change in the skin is noted, such as dimpling, and also the presence of any visible swelling. It must be remembered that the breast should be lifted up during inspection in order to see the sulcus of the breast, and also the presence of Spence's axillary tail, and any other breast tissue in the body. The nipples should now be inspected. The level they are at should be observed, but this level varies sometimes even in normal people. The normal nipple points slightly downwards and outwards. The other points to be observed about the nipple are its colour, its position in regard to the rest of the breast itself, and whether it shows cracks which may point to an abscess. The nipple may show retraction and discharge, and changes in its consistence. Retraction is due to the pull of the tumour exerted upon the milk ducts, but is absent if the tumour is situated at a great distance from the nipple. Discharge occasionally occurs in certain carcinoma, and may be serous or blood-stained, or purulent, and is seen exuding from the nipple orifice. A dry eczema of the nipple if seen would suggest Paget's disease. Any change in the degree of pigmentation of the areola is observed. After inspection of the Breast we come to palpation. This may be done in two ways:-

- I. From the front of the patient.
- II. From behind the patient, and passing alternate hands over the patient's shoulders, i.e. for right breast, left arm over the patient's left shoulder, and for the left breast vice versa.

The breast which is not affected should be palpated first. First with the flat of the hand, and then systematically between finger and thumb. It is then best to carry out again the examination with the patient having her arm on her hip, thus contracting the pectoralis major, and making the presence of any tumour more obvious. The nipple should also be palpated.

The other breast is now examined by palpation in a like manner. Any lump found is now examined and certain points noted.

- I. Its position in the breast, i.e. any of the four quadrants. Though once again the axillary tail and sulcus must not be forgotten.

Tail.

Upper	Upper
Inner	Outer
Lower	Lower
Inner	Outer

2. The consistency and shape. The tumour of malignancy is found to be stony hard, and irregular in outline, and is not separately movable within the breast as a simple tumour is.
3. Fixity to the skin. This is done by gently pinching up the overlying skin. A lump situated behind the nipple however is difficult to do with this test. Early carcinoma do not show this sign in most cases, and if it is present, an advanced growth is suspected. The sign also depends upon the factor as to how deep the tumour is placed.

4. Fixity to the deep structures. Here by getting the patient to put her arm on her hip, we put the pectoralis major into contraction, and by gently trying to move the lump on it we can judge if it is fixed or not. The examination should also be repeated with the pectoralis major relaxed.

The examination of the rest of the breast tissue is also done by palpation, and the nipple squeezed to observe any outpouring of secretion.

Transillumination of the breast may be carried out but in carcinoma of the it would appear useless.

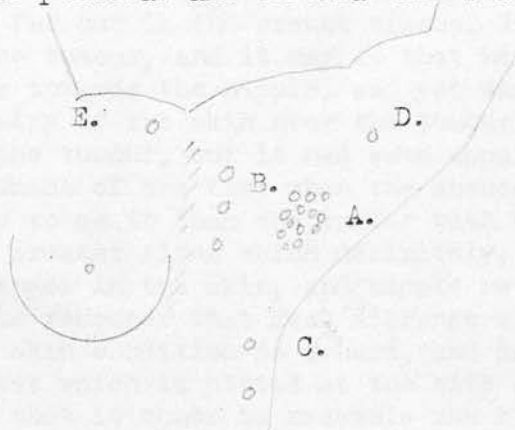
Two other additional methods have been mentioned lately in the British Medical Journal. The first of these states that if the arms are raised above the head as high as possible all the usual signs of carcinoma are increased, and, if not already present are frequently made manifest in the most surprising manner. (British Medical Journal, 1948). The other method is to get the patient to kneel with the arms forward on a support. The breasts then fall into a pendulous position, so that the relations between the tumour and the chest wall are clearly demonstrated. (British Medical Journal, 1948).

We must now pass to examination of the lymph-glands connected with the breast. When examining lymph glands the number, size, consistency, and fixation to other structures should be noted.

The axillae are palpated with the opposite hand if done from the front, and with the same hand if done from the back.

The patient's arm is lifted up, and the examiner's hand is passed into the axilla, and the patient's arm is now allowed to lie loosely at her side.

The hand is first passed upwards over the chest wall between the anterior and posterior axillary folds, whose deep surfaces are also palpated until the finger tips reach the apex of the axilla. The hand is then passed upwards along the lateral wall of the axilla to palpate the lymph nodes on the brachial vessels. The pectoral and cervical nodes are then palpated. (Aird).



- A. Central group.
- B. Pectoral group.
- C. Subscapular group.
- D. Glands around Hiatus Semilunaris.
- E. Costocoracoid.
- F. Cervical.

After examination of the breast and its attachments, we must now examine the rest of the body carefully to exclude the presence of secondaries, especially in the lungs, liver, and rectum, etc.

Special examinations are of little use, and are mainly X-ray in character. This is of special use for examination of the lungs for the presence of secondaries.

Biopsy of the lump may be carried out as part of the examination before a diagnosis is made.

In this case we have a patient who though she had felt a thickening of the skin for a long time, she had never troubled about it. The seriousness of the condition was not thought of by her, because she was unable to say how long she had had it, and would appear never to be troubled about it. However to go against this we may perhaps be allowed to take her place for a few seconds. Here we had a woman, of about sixty years of age, who had a thickening of the skin of the left breast. It did not trouble her in any way, i.e. she had no pain, though on one occasion she had a twitching of her arm. She felt well, and she also had had an abscess in that area thirty-seven years before. Thus she would not be inclined to regard the area as being serious, and probably attributing all her trouble to the abscess. She was also having trouble with the tumour of her left antrum, and no doubt it would occupy her attention more than her breast. This might be a possible explanation as to why the tumour was relatively far advanced when it was examined.

From examination of the breast we find a lump in the upper, and outer quadrant of the left breast, i.e. in the commonest part of the breast for tumour growth. It is a large lump, which is fixed to the skin over it, and is a sign suggestive of malignancy, though it was not fixed to the deep tissues, which is a relative good sign. Nipple retraction was noted, and yet the tumour appeared reasonably far out in the breast tissue. It is due to traction upon the milk ducts by the tumour, and it may be that here, the tumour had spread through the tissues towards the nipple, and yet was not obvious on palpation.

The blackening of the skin over the tumour may have been due to changes caused by the tumour, but it had been apparent for many years, and perhaps it is a remnant of the time when the abscess was present, but it is probably more likely to be it than the tumour with tumour help.

With these present signs which definitely, the hardness of the lump, its fixity, changes in the skin, and nipple retraction, point to malignancy.

We must also remember that Peau d'orange was present and rather supports this fact. This skin condition is a hard, and incompressible oedema of the skin of the breast which is pitted at the site of the hair follicles and sweat glands, so that it comes to resemble the rind of an orange in texture. The pathology of it has already been discussed. A point of interest in the examination is that even with all these signs present in the breast, there are no palpable lymph-glands in the axilla, or elsewhere which are referable to the breast.

The glands in the left supra-clavicular fossa are to be associated with the tumour of the left antrum.

We thus have a lump in the breast showing signs of malignancy, and we must now come to the treatment of the condition.

Treatment.

The treatment of carcinoma of the breast for many years lay in the fields of pure surgery. However encroaching on this field are two other methods of therapy. These are namely X-ray therapy and Hormonal therapy. The entry of X-ray therapy has caused a great disturbance, because its arrival has not been generally welcomed.

It is over fifty years now since Halstead introduced his operation for radical removal of the breast. Since that time many surgeons have used this operation, and many modifications have crept into it. The idea of the radical operation is that in accordance with the laws of cancer, that as much tissue which might be infected or not should be removed. Thus the operation done now consists in the removal of the whole or the breast, the skin over it, the nipple, as much as possible of the fatty, subcutaneous fascia under the skin of the chest wall, the sternal portion of pectoralis major, the whole of pectoralis minor, and the complete axillary contents, comprising glands, lymphatics, and fat and fascia.

In order to do this we have a roughly elliptical incision with prolongations at one or both ends, and has the growth as its central point. To do this accurately the patient is placed on her back, with her head facing to the opposite side, and her arm on the affected side fixed above her head at rather more than a right angle.

After the incision, the first step is to undercut the skin widely in all directions, to the sternum, clavicle, abdomen, and to the latissimus dorsi laterally. The sternal-clavicular parts of the pectoralis major are now exposed and dissected out, and the sternal portion is divided near its insertion into the humerus. The pectoralis minor is now exposed, and its insertion into the coracoid process is cut across. By this method the axilla is now exposed. The contents of the axilla are removed by dissecting the fat and fascia of the main vessels, and nerves, off the subscapularis muscle at the back of the axilla, off the serratus anterior on the chest wall, and off the latissimus dorsi on the outer side. After the dissection, the surgeon divides the attachments of pectoralis major, and minor close to the ribs and sternum gradually working inwards, and in this way completely severing the pectoral muscles with the breast and overlying superficial fascia, from the chest wall. On reaching the inner part of the wound the tissues are easily freed from the sternum, and the rectus sheath.

After complete haemostasis, the wound is closed with drainage, through a separate small incision at the back of the axilla. The drain is kept in for about forty-eight hours, and the stitches for about eight to ten days.



Incision.

In dressing the wound it is advisable to place extra pads of wool in the axilla and under the clavicle so that their presence may assist in the prevention of oozing.

Certain modifications have been put forward by Sir Cecil Wakeley. He thinks that it is important to conserve the clavicular head of the pectoralis muscle, as this protects the axillary vessels, and prevents the skin adhering to them. Oedema of the arm is more likely to follow, as the lymphatics are compressed by the skin crossing the axillary vessels and nerves.

In dissecting the axilla, it is important to remove all the fat and glands below and to the inner side of the axillary vein, according to the general idea in the past. Sir Wakeley reckons that the fat should be left because after such a course is adopted brachial neuralgia is very likely to ensure.

(British Medical Journal, 1948).

Handley and Thackeray advise as part of the operation, that biopsy of the second highest internal mammary nodes through the second interspace. This procedure is of highest prognostic value, and if these nodes are involved, cure is unlikely.

The other method of treatment is that of X-ray therapy. This form of treatment has only come into its own in the past ten to fifteen years. For many years previous, radium was used with the same idea in mind, that the rays would kill of the malignant cells. The use of radium did not appear to be successful, and with the start of x-ray therapy has ceased to be used by the majority of people.

It was in 1935 that postoperative radiotherapy was first used in the Royal Infirmary, Edinburgh, where the radical operation had been done previously alone, and it is mainly from this hospital that further treatment by this method has been carried out.

During the greater part of the treatment of carcinoma of the breast, the only way of treating the disease, was the radical operation however.

Certain results were obtained, which were or should I say be regarded as perhaps reasonable in the circumstances.

When comparing the results put forward in this operation we come up against the fact that different survival rates have been used, some ten, some five year rates. Sir Gordon Gordon Taylor tells of 363 cases submitted for radical operation treated up to June, 1928, and among these the ten-year survival rate was, group I. 84.07%; group II. 29.4%; and group III. 6.5%.

Sir Cecil Wakeley gives figures of stage I, 81% for a five-year rate and for a ten year rate 65%. For stage II, his five year rate is 25%. He does not give any more figures unfortunately.

In a survey done by the British Empire Cancer Campaign, 703 patients were treated by radical mastectomy. The five-year survival rate of the whole group is 47.6%. When sub-divided into stages, there was a five-year survival rate of 68.2%, and for stage II. 43.6%, and 59% in stage III with lymph-node involvement, and 25.6% in stage III without it. These last figures are very strange because here we have a higher survival rate in stage III than in stage II, and also with lymphatic node involvement as without it in stage III. We may perhaps be allowed to compare these figures, but our comparison can only be a very rough one, as we must take into account, the different classifications used in placing a tumour in a group or stage, and also the skill and type of operation used by the Surgeon.

If we make Sir Gordon Gordon Taylor, as A. and Sir Cecil Wakeley as B, and the British Empire Cancer Campaign as C, we may make a table.

	A.	B.	C.
Stage I or Group I.	84.07% (10)	81% (5) 65% (10)	68.2% (5)
Stage II or Group II.	29.4% (10)	25% (5)	43.6% (5)
Stage III or Group III.	6.5% (10)		59% or 25.6% (5).

This table though very rough shows that a reasonable result is obtained in stage I, but when we come to stage II, we on the whole have quite a drop, which is about 20 to 40%. With stage III we have a marked fall in the ten year rate. It is difficult to fit in the 59% figures for this stage, but the 25% would appear more appropriate. Thus we may perhaps say that for stage I the operation has reasonable success over a ten-year period, but in stage II, the figure quoted does not appear very satisfactory in the light of the presence of two further stages in the tumour classification.

The main part I think to judge the operation is perhaps the recurrence rates of the growth. The failure of the operation lies along two routes. The first is that malignant cells may be left behind locally in the chest wall and axilla.

This point has become very obvious in view of the discovery by Mr. R.S. Handley, in association with Dr. A.C. Thackeay that the glands in the intercostal spaces of the internal mammary chain were frequently affected. These glands lie almost on the pleura and can hardly be regarded as harmless, and are very difficult to remove surgically, and was never done in the past.

The other route is that malignant cells may have escaped beyond the area of the operation before this was undertaken.

It is regarded that if there is no recurrence within three years, ninety per cent of the cases can be regarded as cured, but I think it is dependant upon what is meant by cured. Sir Watson Cheyne in 1904 gave that at the end of three years 50.50% of operable cases were free from recurrences. Halstead in 1907 with 232 operable cases showed 38.5% at the end of three years. Where the axilla had not been invaded, 80% remained free for three years, while only 24% are free when there is axillary involvement. Judd and Sisbrunton of the Mayo clinic in a series of 510 cases in the period, 1902 - 1912, 44.7% remained free for three years and 29.8% for five years. Deaver, McFarland, and Herman with 506 cases, they had 54% free at the end of three years, and 26% at five years. Guy's Hospital in a series of 370 cases, had 54.1% free at three years, and 28.4% at five years.

It is difficult to sort out these figures because there must be so many different methods of grading, the method of operation, and also the skill of the surgeon.

It would appear from the figures that only about 40% on the average of all operable cases were alive after three years. However Major Greenwood has found actuarially that for a woman of fifty-five the normal expectation of life was 18.87 years, while with untreated cancer of the breast it was 3.8 years. (Lancet, 1949). Thus from our previous figures, 60% of the cases had died, before a case which was untreated would have died. This is a strange finding, and perhaps may be explained by saying that the cases operated on were perhaps far advanced.

However from all these figures it would appear in the early stages of a tumour, the patient has a reasonable chance, at least about 70% for a ten year survival but once we leave this stage, we enter upon a very different rate. Here we drop to a low level, and the slightest difference in the spread of growth alters the survival rate.

Before leaving radical mastectomy we must not forget that the operation itself carries a risk of death. About the year 1867, the mortality rate was 75%, however with the changes in surgery, in connection with sepsis, etc., Bilroth had a rate of 23.1%. Halstead in 1907 in 76 cases had 2.5%, while Deavers in a period from 1898 - 1913 with 506 cases had a rate of 0.98%. Cade (1948) has collected the figures of twenty-two British Surgeons. There were 11,014 radical mastectomies, with 182 deaths, a mortality of 1.65%.

On the whole however, an estimation of the whole country is about 2.5% (British Journal of Surgery. 1948). The mortality rate however depends upon the type of case, and also the skill of the surgeon. In regard to the use of radiotherapy we may perhaps be allowed to divide it up into two periods, the first before 1940, and the second after it. In 1935, the use of radiotherapy was started, and was given post-operatively. The operation carried out at this time was that of radical mastectomy, and here the survival rate was:-

Year 1.	83.5%.
Year 2.	65.5%.
Year 3.	56.2%.
Year 4.	48.5%.
Year 5.	44.0%.

i.e. a survival rate of 44%.

However compared with general figures already mentioned for radical mastectomy of all operable cases, we have said that 40% appeared to be the average for a three year survival rate. Thus with radiotherapy there is both an increase in the percentage, and also an extra two years. There is however on the one side many cases, while with radical mastectomy and post-operative radiotherapy, we are limited to 569 cases.

In 1941 a change was made in the method of treatment. From the radical mastectomy and post-operative radiotherapy, a change was made to a simple excision of the breast, with post-operative radiotherapy. This was done because it was thought that the trauma of the radical operation, the opening up of tissue planes, the cutting of lymphatic channels which might have tumour growth in them, and also the difficulty in cleaning out the axilla properly, would spread tumour cells, before x-ray therapy could be applied. With this treatment the survival rate was:-

Year 1.	92.0%.
Year 2.	81.6%.
Year 3.	71.0%.
Year 4.	61.5%.
Year 5.	55.9%.

i.e. a survival rate of 55.9%.

Thus it would appear that in the operable cases this method offers a better chance of survival after five years. However once again we do not know the proportion of the 941 cases which belong to stage I, because in this stage alone, radical mastectomy by a skilled surgeon, can give about a 80% survival rate for five years.

I think however that the most important difference lies in the use radical mastectomy or radiotherapy in cases which are inoperable. It is in these cases that success of a treatment will surely show itself.

Figures on 33 cases, which were inoperable between 1930 -1934, in Edinburgh Royal Infirmary, and yet received a radical mastectomy, the survival rate at the end of five years was nil.

Turning to the use of simple mastectomy, and post-operative radiotherapy in inoperable cases we find that the survival rate is 14.1 in five years in 404 cases.

It thus appears to be that in a comparison between the radical operation, and an operation of the simple type and post-operative radiotherapy, it would seem that in the early stages radical surgery is very good, but drops very quickly till its use drops to nothing, whenever the case develops to any advanced stage, while with the other method we have good results in the early stages, but also able to combat the trouble in the late stages to a degree which is definitely not comparable with radical mastectomy.

There are certain points in connection with radiotherapy. The results which come from Edinburgh are only obtained by skillful measurement of the dosage and attention to the patient. Where less experienced workers are using this method different results of a poorer degree must be expected. With this method also the mortality rate must be very low as compared with the radical group. However the figures for survival rate are only for five year periods, and as already stated it is expected that a patient untreated should live for three years and eight months, and thus figures it would appear to be better received if they could be given for ten years.

Some people among the Scandinavians have started using radiotherapy pre-operatively on the idea that tumour cells in the lymphatics may be killed, and then even if a simple excision is done, spread will not be caused by it. Post-operative radiotherapy is however still carried out.

The use of hormonal therapy has been tried for many years now by a few people. One of these people is Dr. Frank Adair, who states that it is "Not a cure for cancer, but has very profound, and gratifying effects". (Lancet, April, 1949). The hormones used are oestrogens or androgens, and thus we have two types of therapy. Pearce Gould way back in 1910 told about a case where a cancerous growth of the breast and its secondaries disappeared spontaneously. However during the past few years, there would appear to be many cases, where a claim has been put forward as to the success in this therapy. Haddow in 1935 after observing that certain carcinogenic hydrocarbons, which had slight oestrogenic activity, and had retarded the growth of malignant tissues, it was just a step to the synthetic oestrogens. It is thus that in the time after this that we find that stilboestrol is brought into use.

In 1944 in a report on one hundred cases it was found that only one case under the age of sixty showed worth while improvement, but in the cases over sixty dramatic regressive results were obtained in five, while improvement was got in twenty-seven. (Lancet). Herman and his colleagues found similar results, and indeed in cases under sixty years of age, it may accelerate extension of the tumour. So much has this fact been known on tumour growth with oestrogen therapy that in a recent court case in California, there has arisen the fact where a woman, whose mother had had a carcinoma of the breast, was being treated by stilboestrol for a certain unspecified complaint, developed a carcinoma of the breast, for which an operation was done. (British Medical Journal, 1948).

The decision as to whether the stilboestrol caused the tumour growth has not been given yet, but here there may be the tendency which was stimulated by the stilboestrol, while on the other hand she may have been going to have a tumour anyway.

A recent paper from America has shown certain results. Here however stilboestrol was not used but ethinyl oestradiol, another synthetic oestrogen. They found that results for the most part obtained in women over sixty, while in younger women the therapy actually appears to hasten the growth of the tumour.

Thus again we have a report similar to that made in this country in 1944.

The American report however draws attention to the fact that there is no really accurate method of discovering whether a tumour growth is being improved. This improvement is really only satisfactory if the tumour and its secondaries disappear altogether. Here we are up against the doubt as to whether the previous growth was truly malignant, unless biopsy has been done. Certain dramatic qualitative phenomena, however, are acceptable as evidence of retrogression.

A decrease in the size of pulmonary metastases, may be recorded radiographically.

No case of the primary tumour or that of metastases completely disappearing seems to have been reported with complete satisfaction. Dr. W.D. Hasler, British Medical Journal, 1946, however states of a case treated by him, which was clinically without doubt a carcinoma of the breast, and was fairly far advanced.

She received three mgn stilboestrol daily, and after six months, her symptoms had gone, and her lump in the breast had almost gone. Here we have one point which is extremely interesting, and is that the woman is ninety-one years of age. Thus here is a patient thirty-one years over sixty which would appear to be perhaps a point with what we know from the previous reports.

In most cases however the synthetic oestrogen seems to influence mainly the skin lesions, while secondaries in the bones are approximately unaffected on the whole. Only recently however Gordon Taylor has described cases where axillary glands were full of tumour growth, and yet though being unoperable were still well after fifteen to twenty years. Adair has pointed that in seventy-five per cent of his cases the agony of bone metastases, particularly of the spine, disappeared within a fortnight, while general malaise and dyspnoea improved. Dodds however emphasises the point that general improvement must not be regarded as regression of the lesion as with oestrogens they may cause a sense of well being.

The dosage at one time was in the region of fifteen mgn daily, but due to work done by Zwaunstein on the inactivation of oestrogen in the body, higher doses should be given. This may be one hundred mgn daily or even more, and pushed to the point of inducing oliguria if necessary.

The other type of hormonal therapy is that using androgens. This is a more recent therapy. Loeser in 1938 suggested this use of androgens, and later he proposed the implantation of a pellet of androgen in the wound at operation, and also the implantation at yearly intervals as a prophylactic measure.

Prudente 1948 reported a 90.4% three year postoperative survival rate without recurrence in patients who received prophylactic treatment of this sort. The dosage appears to be one of high quantity, one hundred mgm three times a week, some clinics are giving two hundred mgm daily. Klainer reports a striking improvement in a female with metastases in the spine secondary to a breast tumour which had been removed. She was given one hundred and fifty mgm of testosterone propionate daily in three divided doses and sixty mgm of terofterin, each drug being injected intramuscularly. After nine months, still on terofterin, the patient was completely ambulatory. Radiographs of the spine showed regeneration of bone in the involved areas, and her only complaint was of mild aching in the lumbar spine after prolonged walking or standing. However it is difficult to state as to whether the improvement was due to the testosterone or the terofterin. (British Medical Journal November, 1948).

There are however great dangers in the giving of this therapy, and it is necessary to ensure that the patient is fit in other systems of the body. This is especially so with the cardiac patient, because sodium, potassium, and nitrogen retention may occur, usually with consequent development of oedema. Other effects on patients are masculinising one, such as facial hirsutis, pimples on the body, enlarged clitoris and increased libido. Disturbances of menstruation, including amenorrhoea nearly always occur. They in some cases very marked, and so severe that they may inhibit the treatment.

Prudente favours this method of treatment to that of ovariectomy, and claims that its usage prolongs life considerably.

It would thus appear that oestrogens and androgens do have some benefit if the patient is over sixty, and the older the patient the better is the result would appear to be. It would appear however that there is not enough known about this type of treatment to give it to a patient as the only form of treatment.

In association with this hormonal therapy ovarian irradiation is carried out in certain places. This is done by the use of x-rays, and has been done in Edinburgh since 1937. This form of treatment is a continuation of the method of Beatson in 1867, who did a bilateral oophorectomy. It is said that these types of treatment holds promise of slowing down the rate of the malignant cells, which escape direct irradiation. Unfortunately there is an evidence that malignant cells may after a time start to grow again even in cases in which the immediate effect was good.

A new form of treatment is by use of an extract called H II has come from America. It is said to be related to extracts in the parathyroid and are probably responsible for physiological cessation of growth. Many cases which were treated with this extract were mostly advanced and inoperable as reported by J.H.Thomson. He says that many cases made a good recovery and became operable as a result of treatment.

In an examination of H II by a committee in this country however, this method has not been welcomed, and there would appear to be great disbelief in it.

The prognosis in a case of carcinoma of the breast is very variable. As in the many cases of malignancy there is a very great possibility of the tumour growth advancing. Scarth and Handley regard the presence or absence of axillary metastases as the most important single factor in prognosis. If these are affected it is difficult to tell how far they are affected, and if your treatment is definitely effective.

It would appear that the more advanced the tumour, i.e. towards group III or IV, the less is the chance of survival even with treatment. If the patient shows a recurrence of the tumour in three years after treatment then again the prognosis is again reduced. The position of the tumour is regarded by A. Lee Mc Gregor as being important as those in the upper outer quadrant are most favourable, while the other quadrants are less favourable, either due to their close proximity to mediastinum or peritoneum.

Thus the prognosis in the case of Mrs. Meldrum is very variable. According to the pathological report she had an advanced growth, but however there were no axillary glands palpable, which is a good sign indeed. However to complicate the picture we must remember that she had already had treatment for a severe tumour of her antrum, and this would decrease the prognosis markedly.

Conclusion.

From the study of this case it would appear that there might be in the aetiology of the disease, a slight possibility that injury of a past trouble may play a part in the causation of cancer of the breast. However from other views the aetiology would appear to be something passed in the milk from the mother, perhaps a virus or a gene. The treatment of this condition is at the moment very variable but from the statements already made treatment by simple excision and x-ray therapy would appear to hold some form of promise. Hormonal therapy over the age of sixty appears very satisfactory, but yet risky to be tried alone, though it might be combined with one of the other forms of treatment.

Name: Matthew Summerville.

Age: 45 years.

Occupation: Farming Labourer.

Address: 3, Westlands Cottages, Arsenal.

Ref: Dr. Anderson, Arsenal.

CASE. NO. V.

Admitted: 20th June, 1917.

Discharged: 1st September, 1917.

Complaint: Passage of bright red blood in his stools.

History:
Present.

The patient states that three months ago, he first noticed the passage of bright red blood in his stools one morning. On several occasions since that time, he has noticed the passage of bright red blood again. The blood has never been dark at any time.

As far back as he can remember, he has been troubled with constipation. He has for the past month been taking a large quantity of laxatives.

A CASE OF CARCINOMA OF THE RECTUM.

ITS COURSE AND TREATMENT.

During this last month his bowels have moved four or five times daily - only small quantities being passed each time. He states that he has been losing weight recently but does not know the extent of weight loss. His appetite has been very poor during the last few months, and he thinks that he is becoming tired very easily. He has had no trouble with his urine, either in passing it, or pain on doing so. He is not breathless at all.

Family:

Present Condition:

Food and Drink:



Family:

Ref:

Name. Matthew Somerville.

Age. 45 years.

Occupation. Foundry Labourer.

Address. 3, Woodlands Cottages, Armadale.

Doctor. Dr. Anderson. Armadale.

Admitted. 30th. June, 1947.

Discharged. 2nd. September, 1947.

Complaint. Passage of bright red blood in his stools.

History.

Present.

The patient states that three months ago, he first noticed the passage of bright red blood in his stools one morning. On several occasions since that time, he has noticed the passage of bright red blood again. The blood has never been dark at any time.

As far back as he can remember, he has been troubled with constipation - for fifteen years at least. He has for the past number of years taken laxatives, and lately had to increase the dose. Within the last month he has had to resort to suppositories.

During this last month his bowels have moved four to five times daily - only small quantities being passed at a time. He states that he has been losing weight recently but does not know the amount of weight loss. His appetite has become very poor during the last few months, and he finds that he is becoming tired very easily. He has had no trouble with his urine, either in passing it, or pain on doing so. He is not breathless at all.

Past.

Nil.

Social Conditions.

Food and Habits.

He states that he lives in good surroundings, and is well fed. He smokes about ten cigarettes a day, and drinks beer only on occasions.

Family.

Nil.

State on Examination.

Intelligence. Very Good.
Development. Good.
Muscularity. Good.
Nutrition. Fair.

General Appearances.

He is a smallish man, who looks his age. He is very cheerful, and very co-operative. He is sitting comfortably in bed, but appears tired. He is palish in colour, and has the appearance of some loss of weight.

Temperature.

This was 98.2 degrees F. on admission.

Pulse.

This was 81 per minute on admission.

Respiratory Rate.

This was 20 per minute on admission.

Blood Pressure.

Systolic Pressure. 130 mms. Hg.
Diastolic Pressure. 75. mms. Hg.

EXAMINATION OF SYSTEMS.

Alimentary System.

Appetite. His appetite has been very poor lately. He does not have the wish to touch food at all.
Thirst. He does not drink any more than usual.
Dysphagia. He has no difficulty in swallowing.
Pain. He has never been troubled with pain in any part of his alimentary tract.
Feeling of Weight. He has never had any feeling of weight.
Distension. On a few occasions he has felt his abdomen to be distended, but it is soon relieved.
Flatulence. He has been troubled to a slight extent with flatulence.
Heartburn, Waterbrash, and Nausea. No complaint.
Vomiting. No complaint.

Action of Bowels. He has been troubled with constipation for many years. During the last three months he has noticed on several occasions the passage of bright red blood in his stools.

Weight. He has been losing weight, but can not give any total of weight loss.

Signs.

Lips. They are reddish in colour, and appear slightly dryish.

Tongue. It is rough, furred, and moist. There is no tremor present.

Teeth. These are false.

Abdomen. General.

There are no abnormalities on inspection. The movements on respiration are equal.

Palpation.

There is no rigidity or tenderness of the abdomen. No mass can be palpated.

The liver is not enlarged.

Percussion. Nil.

Auscultation.

Normal abdominal sounds are heard.

Rectal Examination.

A large irregular hard area situated on the left latero-posterior aspect of the ampulla, can be felt. It feels ulcerated in the centre.

Circulatory System.

Dyspnoea. He has no breathless at all.

Palpitations. None.

Pain. No pain in the praecordial region.

Faintness. Never felt faint.

Arteries.

Pulse. On admission it was 81 per minute.

Rhythm. Average,

Force.

Force. Medium.

Systolic. Average.

Diastolic. Average.

Nature of the vessel wall. Not palpable.

Nature of the pulse wave. Regular.

Blood Pressure.

By use of the Sphygmomanometer: -

Systolic Pressure. 130 mms. Hg.

Diastolic Pressure. 75 mms. Hg.

Veins. No abnormality.

Capillaries.

There is no cyanosis, or dropsy.

Heart.

Form of the Praecordium.

No abnormalities.

Pulsations.

None either in the Epigastrium, upper part of the Sternum, or in the neck.

Palpation.

The apex beat lies within the 5th. intercostal space, inside the mid-clavicular line. There are no thrills present.

Percussion.

On percussion the heart showed no enlargement.

Auscultations.

Mitral. All the heart sounds are
Tricuspid. easily heard, and are
Aortic. quite normal. There are no
Pulmonary. murmurs.

Rate of the Heart.

Average.

Rhythm.

Regular.

The Pulse is present.

Respiratory System.

Cough. No cough.
Expectoration. None present.
Haemoptysis. None.
Breathlessness. None.
Pain. None.

Signs.

Breathing.

Rate. This is usually 20 per minute.
Type. Abdominal-Thoracico.
Rhythm. Regular.

Sputum. None.

Thorax.

Inspection.

The chest is thinly covered. There is a tendency towards the chest being round. There are no local or general departures from normal.

Palpation.

Movements are equal on both sides, and are of a very good expansion. Vocal Fremitus is equal on both sides.

Percussion.

The note was resonant, and equal in all areas, and on both sides.

Auscultation.

Breathsounds. Vesicular.
Accompaniments. Nil.
Vocal Resonance. Equal on both sides.

Urinary System.

There is no pain in any part.

Micturition.

No frequency or pain.

Kidneys.

They are not palpable.

Urine.

Negative.

Nervous System.

Mental Function.

Very Good. There are no abnormalities.

Cranial Nerves.

No abnormality.

Reflexes.

Superficial.

Abdominal. Present.

Plantar. Present. Flexor.

Deep.

Knee. Present on both sides,
and equal.

Ankle. Present on both sides,
and equal.

Haemopoietic System.

The glands in the groin are not enlarged. No glands can be felt enlarged elsewhere in the body.

Spleen. It could not be palpated.

Haemoglobin. 87%.

Endocrine System.

Pancreas. Nothing abnormal. Urine- Sugar free.

Thyroid. It is of average size, and consistence. There are no pulsations present. No symptoms of an abnormal Thyroid present.

Parathyroid. There is no Tetany present, and no signs of changes in the bones.

Suprarenals. No symptoms or signs connected with the Suprarenals.

Pituitary. No abnormalities present.

Locomotor System.

Bones.

Muscles. No abnormality discovered.

Joints.

Integumentary System.

NO abnormality discovered.

Reproductive System.

NO abnormality discovered.

Sigmoidoscopic Examination.

A large irregular hard area- approximately four centimetres in length - situated on the left latero-posterior aspect of the ampulla. It is ulcerated in the centre.

From the history and examination a diagnosis of Neoplasm of the Rectum was decided upon. The treatment suggested was that of 'Excision of the Rectum'.

Non-operative Treatment.

1. Casein Hydrolysate. 2 ozs. daily.
2. Glucose. ad lib.
3. Ascorbic Acid. 50 mgms. t.i.d.
4. Nicotinamide. 50 mgms. t.i.d.

Premedication.

Omnopon. gr. I/3.

Atropine. gr. I/100.

By subcutaneous injection.

Operation.

8th. July, 1947.

Surgeon. Mr. R. L. Stewart.

Anaesthetic. Gas, Oxygen, Ether,
Curare.

Nature of Operation. ' Perineo-Abdominal Resection of Rectum.'

With the patient lying in the prone in the Trendelenburg position, an incision was made from the base of the Sacrum to half an inch in front of, and encircling, the Anus. The Anal orifice was previously closed with a heavy silk purse string suture.

The Coccyx was disarticulated, and the Rectum separated from the anterior sacral wall. The incision was deepened down to the inferior surfaces of the levator ani, and gluteal muscles. The urethra, and prostate were then separated, and the levator ani fibres cut about half an inch from the white line.

The lateral ligaments clamped, divided, and ligated.

With the Rectum retracted posteriorly, the peritoneum was defined, and opened. The Rectum was then enclosed in a bag, and the patient turned round to the supine position after insertion of temporary sutures in the perineal wound, and partial closure of its posterior extremity.

A left lower paramedian incision was then made with the patient in the Trendelenburg position, and the pelvic colon identified.

The lateral peritoeal incisions were extended up each side of the pelvic mesocolon and the Rectum pulled up, and delivered with the pelvic colon on to the surface.

The vascular pedicle of the inferior mesenteric artery was then clamped, and ligated between the first and second branches, and the bowel divided after enclosure of the proximal loop with catgut. A small muscle splitting incision was then made in the left iliac fossa, and the bowel brought through after division.

The serous coat was sutured to the peritoneum in the pelvis. The perineal wound was dressed after insertion of a rubber dam drain, and a rubber glove containing guaze packing.

Penicillin and Sulphonamide powders were introduced into the wounds.

A No. 10. rubber catheter was passed per urethrae, and stitched in situ.

Progress.

The patient received blood and plasma, intravenously, after the operation. He was kept in the operating theatre for at least three hours after the operation before removal to the ward. His condition was satisfactory.

10th. July, 1947.

The catheter was being unclipped at six hourly intervals. He was secreting well. His general condition was very satisfactory.

17th. July, 1947.

The wounds were healing well. The stitches at the proximal end of the perineal wound were cutting out. These were then removed. The catheter was taken out, and he was able to pass water per urethrae with a little difficulty.

29th. July, 1947.

The main wound was healing satisfactory, though the proximal wound was not progressing so well. The colostomy was working freely daily.

3rd. August, 1947.

His progress was very satisfactory.

10th. August, 1947.

The proximal part of the perineal wound was not healing very well. It was then decided to commence ultra-violet radiation to the part.

2nd. September 1947.

The patient was progressing very satisfactory. The wound was still not healed. The colostomy was working very well. He was discharged to Beechmount.

29th. September, 1947.

The patient was reporting back. There was partial healing over the end of the scar occupying the lower end of the Sacrum. He was feeling very well. He thought that he had gained a little weight.

5th. November, 1947.

The patient was reporting back. The wound was soundly healed. He still had some jaggy pain over the tip of the Sacrum. He complained of constipation, and was taking Paraffin Liq., and Milk of Magnesia.

10th. March, 1948.

The patient was reporting back. He was feeling very well. His colostomy was working very well, and had grown smaller.

10th. March, 1948. (cont.).

He complained of some mucous discharge from his colostomy, and also the passage of query threadworms. He was back at work, though taking it very lightly.

21st. July, 1948.

He was feeling very well. He was still at work. His colostomy opening was rather small, but appeared to be satisfactory. He had no urinary symptoms, and did not have to get up at night.

Pathological Report.

Received. 8th. July, 1947.

Issued. 15th. July, 1947.

Nature of Specimen. 'Rectum.'

Macroscopic.

The specimen which consists of the lower part of the pelvic colon, and the rectum, and the anal canal, shows an encircling carcinoma 4cms. long with its lower margin placed 5cm. from the anus.

The growth has well-defined upper and lower margins, and an extensively congested floor, and has caused infiltrative thickening of the wall with grey neoplasm. Early extension into the extraperitoneal fat is evident at one point, but no enlarged glands are present in the neighbourhood.

Microscopic.

The neoplasm is a well differentiated adenocarcinoma. It has invaded all the layers of the bowel, and also spread into the extraperitoneal region. The surface of the growth is ulcerated, and very congested while the related intestinal tissues are widely infiltrated with acute and chronic inflammatory cells from secondary infection.

Differential Diagnosis.

The differential diagnosis in a case of Carcinoma of the Rectum includes the following diseases:-

- Foreign bodies in the Rectum.
- Injuries to the Rectum.
- Proctitis.
- Diphtheritic inflammation.
- Dysenteric inflammation.
- Ulcerative Colitis.
- Cysts of the Rectum.
- Actinomycosis of the Rectum.
- Haemorrhoids.
- Stricture due to the treatment of Haemorrhoids.
- Gonococcal stricture.
- Schistosomiasis of the Rectum.
- Syphilitic ulceration.
- Tuberculous ulceration.
- Lymphogranuloma inguinale.
- Simple tumours.
- Carcinoma of the Rectum.
- Tumour of the Anus with upward spread.
- Sacro-coccygeal tumour.
- Tumour of the Bladder.
- Metastatic deposits in the Pouch of Douglas.

Foreign bodies in the Rectum.

There is usually a history of something being introduced into the rectum, and if retained it may cause obstruction, and also irritation. The foreign body may also come from above.

Injuries to the Rectum.

The rectum may be injured by the passage of instruments or by other cases, such as goring by a bull. Injuries to nearby organs, as in a fracture of the pelvis may cause it. Often the patient is unaware that it has occurred. There may be abdominal pain and hypogastric tenderness and a pelvic peritonitis occurs.

Proctitis.

Catarrhal inflammation of the rectum is rarely primary, but usually comes from above. The patient suffers a severe pain in the rectum and posteriorly over the sacrum. There are persistent calls to stool, and a mucous or purulent discharge is got which may be tinged with blood.

Diphtheritic inflammation.

This condition occurs rarely and there is a history usually of diphtheria being present. It occurs in the lower end. Usually painless. Culture reveals the bacilli.

Dysenteric inflammation.

In this condition there are multiple ulcers present. The intervening mucosa is hyperaemic, and the infecting organism can usually be isolated. There is periodic diarrhoea and blood in the stools. There is usually other signs of bowel infection higher up. The condition may be bacillary or amoebic, and if amoebic other organs usually show signs too.

Ulcerative Colitis.

This condition may be acute or chronic. The chronic form shows persistent diarrhoea. There is varying amounts of mucous and blood present in the stools. The appetite is usually fair till the late stages. Pain if present is rarely severe, and may be colicky discomfort. Anaemia usually occurs. There is an intermittent form where some motions passed may be normal. Differentiation may be made if there is any difficulty, by careful sigmoidoscopic examination, and recognition of the pathological changes of ulceration, and inflammation. The descending and pelvic colon and rectum most, and often only, affected.

Cysts of the Rectum.

This consists of dermoid cysts. They can be detected as round masses outside the bowel, and usually do not give symptoms till adult life. Infection and suppuration rarely occur.

Actinomycosis of the Rectum.

This is an uncommon condition. The parts of the bowel usually affected are the caecum, appendix, and pelvic colon. If it does occur there is a mass of abscesses and marked suppuration thus, with the presence of it in the stools. Sulphur-like granules may be recognised in the thin serous pus.

Haemorrhoids.

This name is applied to a varicose condition of the veins about the anus and rectum in its lower part. At first there is the presence of occasional haemorrhage of slight degree associated with the passage of constipated stools. As the condition progresses the loss of blood becomes more common, and on occasion considerable. As the final stage is reached haemorrhage becomes rare but the haemorrhoids are inclined to remain down after a motion, and do not stay back when pushed up. The condition may however be secondary to other conditions, one of these being a tumour of the rectum, while others pelvic tumours, and lesions of the portal system. Careful examination of the rectum, and pelvis, and the abdomen, etc., is needed before ruling out the other causes.

Stricture due to the treatment of Haemorrhoids.

Sometimes after the treatment of haemorrhoids by injection stricture of the rectum occurs, and thus a progressing constipation. There is however the history of treatment, but examination must be made to exclude neoplasm.

Gonococcal Stricture.

This is a complication of gonorrheal proctitis. This condition is not uncommon in women, and starts as a mucoid discharge, and later becomes copious and purulent. This condition later if untreated, and even treated, may lead to ulceration and subsequent stricture, from fibrosis. There is thus the history of the first condition. The complaint at this stage will be mainly constipation.

Schistosomiasis of the Rectum.

This condition is more common in countries like Egypt, South Africa. It is usually associated with bladder lesions. There is free rectal bleeding, and sometimes a mass of granulation protrudes from the anus. The typical spiked ova can be isolated from these granulations. This condition is however more common in children.

Syphilitic ulceration.

Primary chancre may occur in the rectum, and gives rise to an ulcer commonly situated in the posterior commissure of the anal canal. In the tertiary stage gummata of the rectal wall occur. The condition is often painless. Mucopurulent discharge is marked, and you get spurious morning diarrhoea. There is occasional haemorrhage. Examination of the rectum shows the typical punched-out serpiginous syphilitic ulcer.

Tuberculous ulceration.

This is due to the swallowing of infected sputum, in patients which have tuberculosis present elsewhere in the body which is usually obvious. It starts as a submucous plaque, which breaks down, and leaves a ragged, irregular ulcer. The ulcer bleeds easily. The patient complains of periodic diarrhoea and that the haemorrhage is slight. Examination of the patient and also of the rectum with the finding of tuberculosis in the body, and the ulcer in the rectum is a diagnosis.

Lymphogranuloma inguinale.

This condition is more commonly seen in women, and appears to be due to a filterable virus. It may lead to a very severe form of rectal stricture. About twenty-five days after infection, there is the formation of the 'lymphogranuloma chancre'. In females the condition may become chronic and there is ulceration of the genitalia as well.

Simple Tumours.

There are various forms of simple tumours of the rectum. These are adenoma, which is common in children, and is a pedunculated, red, tumour, like a cherry on a stick. The tumour may show at the anus, and may cause tenesmus, and bleeding. It may be distinguished from carcinoma of the rectum if the surface is unbroken. Another is a Villous papilloma which occurs in adults beyond middle life. This tumour has a great tendency to malignant change. There is a glairy mucoid discharge, and usually bleeding. The fibroma may be a true submucous fibroma or an organized thrombosed pile. There is a short broad pedicle. Other simple tumours may be an angioma, lipoma, myoma, or endothelioma. Differentiation may be made by the appearance of the tumour, but the main way is by the pathological picture.

Carcinoma of the Rectum.

These are either adenocarcinoma, papilliferous, or melanotic. Growths at the pelvi-rectal junction tend to be annular, while those at the ampulla, tend to be proliferative or ulcerative. The adenocarcinoma is of various types. It may be proliferative, and is highly cellular. It is in the form of a fungating and ulcerating form. Another type is the ulcerative, and here the ulcer may be an elevated plateau with a red base and a hard rolled edge, or it may be a deep excavation of the rectal tissues.

The annular form shows a lot of fibrous tissue, and is usually near the recto-sigmoid. The colloid form is really an adenocarcinoma but has large amounts of mucoid material in the cells.

The papilliferous carcinoma is a malignant change in a villous papilloma. The melanotic carcinoma is very rare, and is the most malignant.

Carcinoma may be present for a while before symptoms show. Constipation is usually the first complaint, though this may have been present for a long time, and this is followed by alternate constipation, and diarrhoea. Other symptoms are the passage of blood, and slime, tenesmus, rectal discomfort, and anorexia, dyspepsia, and cachexia. Pain is a late symptom and usually means that there is involvement of the nearby tissues by tumour spread. Other symptoms may arise if there is the presence of secondaries in other organs of the body, such as ascites, jaundice. Examination, and pathological examination of the rectal tumour makes the diagnosis. In the present case the patient only showed a complaint of the passage of some blood in his stools. He was not fevered, and did not complain of diarrhoea, except that he took laxatives. He did say that he had constipation but he had had it for so many years, though it was appearing to be becoming worse. On examination an irregular, hard area was found on the left latero-posterior aspect of the ampulla, and was ulcerated in the centre. This appearance is suggestive of carcinoma. The final diagnosis was finally made by the pathological report, which told us that it was a well differentiated adenocarcinoma.

Tumour of the Anus with upward spread.

These may be both simple and malignant.

The simple are papilloma, lipoma, and a soft fibroma. The main signs are an irritation and occasionally bleeding. The malignant are a columnar-celled adenocarcinoma, a squamous epithelioma. Pain and difficulty on defaecation may be the first complaint, sometimes associated with bleeding and discharge. Careful examination of the area however usually makes the diagnosis clear, though at the level of the rectum and anus difficulty may arise, especially with the columnar-celled adenocarcinoma, which may have passed down from the rectum.

Sacro-coccygeal tumour.

These are mainly chordomas, and the tumour infiltrates widely. It may arise at any age, and is more common in the male. Pain is the most frequent symptom, the pain being greatest in the rectal region. Finally there are symptoms of rectal involvement. X-ray may show involvement of the sacrum.

Tumour of the Bladder.

These usually start with a painless haematuria, which occurs at intervals. At a later date a superimposed cystitis arises, and haematuria becomes constant. It is in the late stages that the rectum may be affected by spread of the tumour in the bladder neighbourhood. The urinary symptoms are however prominent.

Metastatic deposits in the Pouch of Douglas.

The presence of these may effect the bowel motions, and these are recognised by rectal examination of the Pouch of Douglas. A hard mass is felt in the area. There are usually signs of the primary growth present in some other part of the body.

The patient, Matthew Somerville, forty-five years of age, was admitted on the 30th. June, 1947, to Ward, 6, of the Royal Infirmary, Edinburgh. He complained of the passage of bright red blood in his stools. This had happened three months before admission, and since that time, he had noticed this occurring on several occasions. He was always troubled with constipation, being forced to take laxatives for many years now. In the last few months he had had to increase his dosage, and even use suppositories.

In the month previous to admission, he found his bowels were moving four to five times daily, passing small quantities at a time. For the past few months his appetite has been very poor, and he is easily tired. His weight has been going down.

When examined in bed in the ward, he appeared tired, though remained cheerful. He looked as if there had been some weight loss.

On examination of the various systems, the only positive finding was a large irregular, hard area situated on the left latero-posterior aspect of the ampulla, feeling ulcerated in the centre.

This finding was made positive by direct vision, i.e. sigmoidoscopy.

The diagnosis of neoplasm of the Rectum was made. No obvious secondaries being found, it was decided to treat it by operation. Due to the patient's condition which was not good due to his complaint, and also lack of adequate food for the past few months, it was decided to try and build the patient before the operation.

He thus received Casein hydrolysate daily. He also received Glucose ad lib, Ascorbic acid 50 mgms, tds, and Nicotinamide 50 mgms tds. The patient was prepared for operation which was carried out on the 8th. July, 1947, by Mr. R. L. Stewart, using the 'Perineo-abdominal' type of operation. The anaesthetic given was Ethyl Chloride, Gas, Oxygen, Ether, and Curare.

The patient's condition at the end of the operation was very good considering the type of operation. A fair degree of shock was however present, and an intravenous drip of blood, already cross-matched was started, with the patient lying on the operating table. The patient was kept on the table for about an hour and a half before removal to his bed, which had been brought to the theatre. Another hour was allowed to pass before he was removed to the ward, where more blood was given. Saline was then started.

His condition improved considerably in the next few days.

A catheter which had been passed per urethra was being unclipped at six hourly intervals, and he was secreting well. A week after the operation, his catheter was removed, and he continued to secrete well. The wound was healing well. A few days after it was noticed that the proximal part of the wound was not healing well and ultra-violet radiation was commenced. On the 2nd. September, 1947, he was discharged to a convalescent home. He reported back on several occasions afterwards. His wound was healed soundly, and his colostomy though small was working well. He had resumed his occupation again. The pathological report issued on the 10th. July, 1947, showed the growth to be a well differentiated adenocarcinoma. The diagnosis of Carcinoma of the Rectum was therefore proved.

Anatomy of the Rectum.

The rectum is developed from the hind-gut. At a very early stage the greater part of the hind-gut is divided into a dorsal and a ventral part by a septum which grows tailwards from the point of junction of the hind-gut and allantois. The septum is split lengthwise and the dorsal and ventral sections of the gut are then quite separable. The dorsal section becomes roughly, the colon and the ventral section shrivels and becomes the urachus.

The terminal part of the hind-gut is for a long time undivided, and expands to form a chamber called the cloaca, but a continuation downwards of the septum divides it into two parts, the rectum, and the upper part of the anal canal dorsally, and a uro-genital part ventrally.

The rectum is five inches long, and begins opposite the middle of the third piece of the sacrum as a continuation of the pelvic colon, and following the curve of the sacrum, and coccyx, and ends one inch beyond the tip of the coccyx by bending backwards to become the anal canal. The lower part is dilated, and is known as the rectal ampulla, and bulges forwards rather than sideways. It has three lateral flexures, two concave to the left, the middle one to the right, each having corresponding fold in the interior, called a horizontal fold of the rectum including mucous, submucous, and part of the muscular coat. The middle fold is the biggest, and is at the level of the lowest part of the peritoneum on the side of the rectum.

The rectum is covered on the anterior and sides of the upper third by peritoneum. It also covers the anterior surface of the middle third, and is then reflected onto the bladder, forming the bottom of the recto-vesical pouch three inches from the anus (and about an inch above the base of the prostate). The lowest third is below the level of the peritoneum, and is embedded in fat and fascia.

Anteriorly so long as it is covered with the peritoneum it is related to the terminal part of the pelvic colon. Below the reflection of the peritoneum it is related to the posterior surface of the bladder in the median plane, and to the termination of the vas deferens, and the seminal vesicle on each side. The anterior wall of the rectal ampulla is related to the posterior aspect of the prostate. Posteriorly the rectum is related to the lower part of the sacrum, coccyx, and the ano-coccygeal body, in the median plane, and to the lower part of piriformis, coccygeus, and levator ani, on each side. Between it and this bed are the median sacral vessels, sympathetic trunks, lower lateral sacral vessels, third, fourth, and fifth, sacral nerves, and coccygeal nerves, besides alveolar tissue.

The superior rectal artery at first posterior, divides to pass down along its sides to sink into its substance about its middle.

The blood supply is derived from the median, sacral, and from the superior, middle and inferior rectal vessels. The nerve supply is derived from the pelvic splanchnics. The lymph vessels of the rectum end in the ano-rectal lymph glands, which lie in or on the wall of the rectal ampulla, and the internal iliac lymph glands. The efferents from these glands pass to the lower aortic lymph glands. The muscular coat of the rectum differs from that found in the rest of the large intestine in that the longitudinal fibres form only two broad bands of which one is placed on the anterior, and the other on the posterior aspect of the gut.

Discussion.

Rectal carcinoma is a disease which is usually seen in people over forty years of age, and more often in people over sixty years of age. Cases have however been reported at the early age of ten. (Romanis and Mitchiner). The majority of people agree that it is a commoner occurrence in man than in woman. It is stated that cancer of the colon is common to woman, while cancer of the rectum commoner to man. (Boyd's Pathology). Over sixty per cent of cancers of the bowel are usually to be found in the rectum.

Aetiology.

The origin of rectal carcinoma is as varied and indefinite as that of carcinoma of other parts of the body. However certain facts do emerge from all the statements which have been made, though these facts can not be taken as primary causes, but on the whole only as secondary ones.

At the present stage, however, it is not easy to divide these facts, but we can perhaps try and do it in two types:-

I. Exogenous.

II. Endogenous.

In the exogenous group, the first factor which is thought of is that of chronic irritation. This must be a main factor in carcinoma of the rectum, as this part of the bowel is always filled with faecal material. This faecal material may be kept in this part of the bowel for several days, before evacuation is allowed to take place. Thus the rectum is strained considerably by this weight, and due to this movement, a certain amount of irritation is set up on the mucous layer of the rectal coat. To back this statement up, it is usually found that the patient has been troubled with marked constipation, and has had to take laxatives for many years before the start his major symptoms. This constipation has even been found to have been present since early childhood in certain cases.

Certain chemical compounds on deep inspection, and experimental research on mice have been found to produce carcinomatous like growths.

The intestine of man is a passage for both chemical products of the body, and also for chemical substances which have been taken into the body. If a person's body metabolism becomes upset, certain chemical products may be excreted into the intestinal lumen, and passed down to the rectum, where if the bowel action is very poor, the chemical substance may lie there, and take the opportunity of attacking the rectal mucosa causing the cell mitosis to become upset.

It has been shown that Cholic acid, which is an organic substance occurring naturally in the body can be converted by chemical means into methylcholanthrene. On testing this substance, by trials on mice, it is found to be amongst the most powerful carcinogenic agents known.

It was believed that this substance would have to be acting over a prolonged period of time, but Mider and Morton in 1939, showed that a single application of methylcholanthrene applied to the skin caused a cancerous growth.

However even simple substances, such as zinc chloride have been found to cause the growth of the complicated tumour known as a teratoma when injected into the testicle of a rooster.

From this it is not possible to make a definite answer on the suggestion of chemical causation.

Trauma is often accused of being an exogenous carcinogenic agent. It is difficult to apply this type of agent to carcinoma of the rectum. Slight trauma, and strain may however be caused by constant straining during the act of defaecation. In the case of carcinoma of the rectum, as different from many other situations of the body, we come across what are known as pre-cancerous growths. These may be papilloma, adenoma, and the papillary formation occurring in chronic ulcerative colitis. By far the greatest danger is familial multiple papillomatosis. Thus there is present a benign growth before the carcinoma appears. However as to the causation of these benign growths and the reason for the change from being benign to carcinomatous, a difficulty arises.

In the last year or two, a new approach has come to light. This is the suggestion that in some cases a virus may be at the root of the problem, and cause irritation in the nucleus of cells, and lead to abnormal growth and development. A papilloma known as the Shope type has been produced in this way. (British Medical Journal, Jan. 1947).

Another suggestion put forward is that by Haddow. He suggests that malignancy may be due to disordered metabolism caused either by interference with the nutrition of the cell, or by poisoning of some enzyme system.

This idea is quite a possibility, and is however a further step in the chemical causation of the carcinoma.

Dietary deficiency has been shown to play a large part in Hepatomas and Cholangiomas, (Millin et al. 1941), but it is difficult to explain for rectal carcinoma.

In the endogenous group it is as difficult again to agree upon any one cause. Some appear to fit better than others. Just as chemicals may be passed into the body, chemical substances in the body may change, and become carcinogenic agents. Heredity has been decided upon by many people as playing a large factor. This factor was brought by a committee in 1946, which examined fifteen hundred cases of carcinoma of the rectum or anus, and found the hereditary factor present in a reasonable number of cases. (British Medical Journal, Jan. 1947).

To support this factor the case of death occurring in two sisters, both from carcinoma of the rectum has been quoted. (British Medical Journal).

Perhaps the cause lies in the transmission of the carcinogenic factor by the genes.

Emotional origin has lately appeared, (British Medical Journal, Aug. 1948), and it is said that here people think that there is something wrong with their bowels, and because of this the action of the bowels are upset, and constipation follows, and carcinoma may arise.

This idea can not however explain the large number of occurrences of this growth and only leads to the idea of something playing its part after the consistent lack of proper bowel action.

The age group is as usually found in that of the forties or over. It is as if at about this age some endogenous control in the body disappeared, or that certain cells in the area were only able to keep on doing a normal routine for a certain number of years.

Stocks has shown that in different districts where the water supply is different, varying rates of occurrence of carcinoma of the stomach are found. This might be applied to cancer of the rectum, as whatever there might be in the water, if anything, must pass through the bowel unchanged, and affect the rectum, where it may have longer to act. (Lancet).

It is on the whole very difficult to put forward any exact causation, as even death rates in this disease, vary in different parts of the world, and in the occupational and social groups of mankind.

The aetiology in this case is not apparent. There is only one fact that would appear to emerge from his history, and that is his long history of constipation, which he has had for about fifteen years. He has also had to take laxatives for a long time. Whether these have played a part in the causation of his disease, it is difficult to say, though I would think that it has done so some how.

Pathology.

There are many types of different carcinoma of the Rectum. These are as follows:-

1. Annular.
2. Cauliflower.
3. Mucoid. (Formerly called Colloid.)
4. Melanotic.
5. Carcinoid.

The Annular type is usually situated high up in the region of the of the pelvi-rectal junction. It may be situated however, at or just below, the peritoneal reflection.

In this type the tumour infiltrates the wall of the rectum, and surrounds the bowel as a circular growth which may cause an extreme degree of stenosis. The fibrous stroma of the tumour contracts, and from the outside it gives the appearance as if a tight string had been tied round the bowel. The bowel above this part becomes dilated, and hypertrophied, while that below becomes collapsed.

Often hard faecal masses may be formed on the proximal side of the tumour, and may give rise to superficial erosions of the rectal mucosa, which form stercoral ulcers.

Ulceration in this type of tumour is said to occur late. It is the commonest type of tumour, and occurs in about eighty per cent of cases.

The Cauliflower type of tumour grows into the lumen of the bowel, and may become a large mass, which may soon become extensively ulcerated. It is usually situated in the region of the ampulla of the rectum. It has been found that in thirty per cent of cases, associated with the tumour, are papillomata. (Illingworth). It is present in about fifteen per cent of cases. Due to the large extensive growth into the lumen of the bowel, obstruction occurs early.

The mucoid type of carcinoma occurs rarely in the rectum. There are two different forms:-

- I. Primary mucoid carcinoma arising from the mucous secreting cells.
- II. A secondary form which is merely a mucoid degeneration of a pre-existing adeno-carcinoma.

The primary is a very malignant growth, with obstruction occurring early.

The Melanotic tumour is the most malignant type of tumour growth, and death occurs early.

The Carcinoid type of growth was classed as being a rare occurrence but as examination of growths becomes more frequent, cases have been found to show a greater frequency, and in America the reason given is this lack of proper histological examination in the past. (American Annals of Surgery).

From the histological point of view, carcinoma of the rectum shows a picture of an adeno-carcinoma, with columnar cells.

There is considerable variation in the different tumours. The common appearance is one of ill-formed acini or alveoli, composed of cells of primitive type with many mitosis. More benign types may give the impression of a simple adenoma. The fungating type is more likely to be well differentiated than the infiltrating form, which may develop a dense stroma.

The mucoid type, which is the most malignant, is composed of irregularly arranged cells distended with lightly staining cytoplasm. (signet-ring pattern).

This type must be differentiated from the relative benign types in which a high degree of differentiation is suggested by elaboration of mucous within the irregular acini of the tumour.

The melanotic type if well formed shows cells which are large, polyhedral, and usually show a characteristic alveolar grouping, the groups being separated by a fine stroma. Sometimes it is difficult to see the melanin as it is deposited in patches and easy to miss in microscopic sections.

In the carcinoid type the appearance is usually that of festooning ribbons of columnar cells. These cells are spheroidal or polyhedral with granular or finely vacuolated cytoplasm. The cells are rich in lipid. The tumour has been shown by Pierre Masson to be a Chromaffinoma.

In regard to malignancy with these different types, there is great variation. The most malignant is the melanotic type, followed by the primary mucoid. The carcinoid is a relatively benign one.

The cauliflower type is usually to be better differentiated than the annular type, and it is upon this differentiation that both grading, and prognosis, and generally treatment by operation are based.

There are four grades of malignancy, the points for grading purposes are:-

I. Absence of differentiation.

II. Hyperchromatism.

III. Number of mitotic figures.

It is stated (Boyd's Pathology) that in carcinoma of the rectum grades one and two, may be treated by excision, while grades three and four, which show very advanced malignancy have only irradiation left.

There are three ways of spread of the primary growth:-

I. Spread by direct infiltration.

This varies according to the position of the tumour growth. Tumours at the pelvi-rectal junction encircle the wall. Only at a late stage do they spread through the rectal wall, and reach the parietal peritoneum, and from here may pass to neighbouring viscera.

A tumour at the ampulla usually grows centrifugally, especially of the crateriform ulcer type.

The muscular coats are penetrated, and then spreads in the fat, and areolar tissue around the rectum. By piercing the fascia covering the rectum, spread may pass to the sacrum, bladder, seminal vesicles, and prostate.

The pelvic cellular tissue may become infected.

II. Spread by the blood stream.

It is a rare occurrence but may occur early on. Usually found in very rapid growing tumours. The liver is usually the only organ affected, though cases of secondaries in the lung are reported.

III. Spread by the lymph vessels.

Lymphatic involvement is stated to be an early occurrence, (Romanis and Mitchiner), and though it is said that the nodes are not enlarged by tumour spread but just infection early, doubt exists. (Illingworth and Dick).

The glands affected are situated in the peri-rectal fat, and within the fascial sheath. Spread of carcinoma beyond the rectum by a general lymph vascular permeation appears to be prevented by the investing fascial sheath, therefore involvement of the peritoneum by this way is rare. The iliac and then lumbar nodes may be affected lately.

Invasion of the peritoneum of the Pouch of Douglas occurs occasionally, and is probably lymphatic in origin.

In the later stages spread may pass to the hepatic and omental glands, and cause secondaries, which will cause effects such as jaundice, ascites, etc. The cause of death in carcinoma of the rectum, and also the chances of survival are very varied.

These depend upon the malignancy of the tumour growth, and the amount of spread, both direct, and distant, of the tumour.

In a low grade tumour, the first sign may be obstruction of the bowel, which if untreated will lead to retention in the body of metabolic products.

In a tumour of a higher grade, direct spread to neighbouring organs may occur, and lead to very serious consequences.

When metastases occur in other organs, vital mechanisms of the body may be affected, such as the liver, and as this is the usual organ to be affected, jaundice may arise, and ascites follow, leading to pressure on the heart, and failure of this organ.

These patient's with carcinoma of the rectum are however in a very poor physical condition, and are thus very likely to take an infection, e.g. pneumonia, and die from it due to their lowered resistance.

The classification of the cause of death is however that the primary reason is the carcinoma of the rectum, while the other parts are secondary.

The pathological report on the rectum, which belonged to the patient in this case, showed the tumour to be of the encircling type. The wall of the rectum had been infiltrated, and also passed into the extra-peritoneal fat. No enlarged glands in the neighbourhood were found which is a very good sign. This is often the case in this type of tumour growth due to its slow formation of spread and metastasising.

From the microscopic picture the neoplasm is shown to be of the typical type, i.e. an adeno-carcinoma.

The report also shows it to be well differentiated, which puts it into either grade one or grade two, though due to its small spread in all probability in grade one, and very suitable for removal by operation.

Features.

The signs and symptoms of carcinoma of the rectum are very varied. The classical symptoms are usually only seen when the tumour has been present for a long time. No matter how long the tumour is present, some time or other it will show local signs.

There are great variations in the symptoms although in their basic way they are all connected.

Usually the first sign is a discomfort being felt in the rectum, or as a patient often puts it, that 'there is an irritation in the back passage'.

This discomfort usually being apparent after he has defaecated, and he gets the feeling that he has not completely emptied the bowel. The patient however did not complain of this discomfort, and it is all probability due to the fact that as he had had constipation for so many years, and taken laxatives to such a great extent, that his bowels were probably emptied satisfactorily at defaecation.

Distension of the lower abdomen is often noticed, and the passage of excess of flatus may be present.

Diarrhoea usually occurs early on. This usually occurs when the patient rises first thing in the morning, and is due to mucous and faecal matter in the bowel, which accumulates in the night, causes the patient to rush and defaecate immediately on rising from his bed.

There may be some tenesmus, or bleeding with the diarrhoea, and the stools may be very offensive.

As stated already blood may be present in the diarrhoea, as well, mucous or pus may be seen due to secondary infection of the tumour. This may easily occur in the friable cauliflower type, which may be broken up, and become ulcerated, and become infected.

It is very difficult to say whether the patient had true diarrhoea. During the last month before admission his bowels moved four to five times a day, not necessarily in the morning, but though this may be due to the presence of the tumour growth, but part may be due to the amount of laxatives, and even suppositories taken by the patient.

Often periods of constipation occur alternating with periods of diarrhoea. The sign of bleeding from the rectum, or the passage of blood in the stools occurs. This is a sign usually connected to the type of tumour, which could break down, and thus allow haemorrhage to occur. Thus the cauliflower type of tumour which is very friable and is liable to break down, ulcerate and bleed.

Bleeding does not occur till ulceration occurs. Thus because of this sign the patient may complain first of haemorrhoids, and though these may be present careful examination must follow to disprove the presence of a tumour if possible.

This sign of bleeding was the actual cause of the patient first going to his doctor. He suffered this complaint on several occasions. The important point about his description of the blood, is I think that he states that it was bright red. This is important in comparison to venous blood, which comes from haemorrhoids, and is dull in colour. As the pathologists report stated, the tumour growth was ulcerated, and thus the possible cause for the bleeding. Pain is a very late sign, and also a very bad one to occur. It means that the spread of the tumour has affected extra-rectal organs, e.g. the sciatic nerve, and cause pain. While the growth is present in the rectum no pain occurs due to the absence of pain receptor endings.

Thus as the patient did not complain of pain, we have a good positive prognostic sign.

Other symptoms follow on from those already mentioned. The appetite becomes poor, and partly due to this, and also to the presence of the growth, the weight of the person decreases, sometimes very rapidly, and tiredness also occurs too.

If bleeding has been severe at all, or constant, the amount of blood loss may lead to the patient suffering from anaemia, sometimes pernicious in character.

There may be obvious signs of metastases, such as the liver function being upset, or respiratory distress in secondaries to the lungs.

The patient showed no signs of the presence of secondaries, though he did show the ill affects of the tumour itself namely the poor appetite, and loss of weight and tiredness.

Obstruction may occur but is commoner to a sigmoid placed tumour.

Examination of the patient must now follow.

The general appearance must be observed. From this you can tell roughly the condition of the patient. Whether he has lost a lot of weight or not, and if he has become dehydrated, or anaemic looking.

Abdominal examination is done first. This includes inspection, palpation, and percussion.

This examination may show negative findings.

Sometimes the abdomen shows distension, and there may be slight rigidity of the lower abdomen. If the colon is distended, and full of retained faeces, it may become palpable in the left iliac fossa.

This examination includes palpation and percussion of the Liver, and also the Spleen. The kidneys should also be examined.

The anal region should now be carefully examined. To do this a good light is needed. Any abnormality should be noted, e.g. prolapsed haemorrhoids, anal fissure, and the presence of a growth in this area or showing through the anus. After this the rectum must be examined, and to do this a digital examination is carried out. This may be carried out in any of three positions:-

I. Left Lateral.

II. Genu-pectoral.

III. Lithotomy.

The left lateral is the one usually used. The whole of the area must be felt with the finger including all the neighbouring structures, e.g. prostate.

The tumour growth may be felt with the finger tip, as a mass projecting into the lumen of the bowel, or a narrowing of the lumen, and may prevent the finger passing through it. The Pouch of Douglas is examined for secondaries.

The other systems of the body are now examined to find out if there are any recognisable secondaries, e.g. an enlarged liver.

Special examinations may now be done. To increase any evidence previously found in the rectum, a proctoscopic examination may be done. Here however only a small part is seen and a sigmoidoscopic examination is preferred.

The patient may be either in the left lateral or the lithotomy position. The sigmoidoscope, which is a long metal tube, about a foot in length, and can be illuminated inside, and observed in its whole length, is lubricated, warmed and passed into the rectum.

The rectal ampulla is examined, and then passed upwards allowing for the curvature of the rectum.

This examination was carried out on the patient, and the positive proof of the neoplasm was obtained as it could actually be seen.

X-ray examination may be done, though it was not done on this patient. The type usually done is a Barium Enema. This fills up the rectum, and colon, and shows up any abnormality in the lumen of the bowel, of the wall of the bowel, e.g. a constriction.

From these a satisfactory diagnosis can usually be made.

X-ray examination of the chest should be carried out to show up any hidden secondaries, in the chest.

It was suggested a number of years ago, that by use of the Colloidal Vanadate reaction, introduced by Bendum, in 1931, as a diagnostic test for cancer, and subsequently modified by Cronin Lowe, that the extent of a growth, and the possibilities of secondaries being obtained from the result.

The reaction depends upon the effect of vanadate solutions on the blood serums, the results being interpreted by estimation of the precipitations obtained.

The chief factor in producing differences in precipitation is probably the globulin content. The test is however very delicate, and is not regarded as specific. As to its exact positive use in a case of carcinoma of the rectum, it is difficult to state, as no proof can yet be found.

After the diagnosis has been reached, the decision of treatment must be made.

Treatment.

This will depend upon the type of tumour, and the extent of the tumour, i.e. both in its primary position, and secondaries if present. It is however usually impossible to say whether a growth is removable or not, and also which is the best method of removing it, until the abdomen is opened.

Operative treatment must be preceded by the preparation of the patient.

The patient is usually run down, and may have become quite anaemic. Due to this the haemoglobin is very important, and if very low, a blood transfusion may be required before operation. Often packed red cells are the best. Intravenous saline and glucose may be given to rule out dehydration, and any salt depletion that the patient has.

The patient received Casein Hydrolysate, a protein extract, which is used to try and improve the patient's nitrogen balance. Vitamins were given too, specially vitamin C, which is classed as a vitamin of great importance in the control of infection.

Before operation as well it is best to wash out the bowel by enema from below, and also by laxatives from above. Some people however do not do the enema, as it may disturb the tumour. A course of sulphonamides such as Succinylsulphathiazole, should be given to try and get an aseptic operation area. Penicillin should also be started, two to three days before the operation.

The area for operation is cleande and shaved, and a suitable antiseptic placed on the area, and the whole wrapped in sterile cloth.

The diet on the day previous to operation should be a light one, something like fish, and milk pudding. On the day of operation, the patient should have a cup of sweetened tea, or a glass of orange juice, not later than three hours before the operation.

The choice of anaesthetic has changed with the new advances in anaesthesia. In the past general anaesthesia was used for this operation, but now spinal analgesia is greatly favoured.

Though it is not necessary to keep the anaesthetic deep during the operation, because of which the patient's condition appears good, particularly if a gas, oxygen, cyclopropane, or gas, oxygen, ether, sequence is used. Whenever the rich oxygen anaesthetic is stopped, and especially when returned to bed, the accumulated effects of trauma(which the light anaesthesia has failed to block), and loss of blood becomes manifest, and signs of secondary shock appears. It has been shown that when spinal analgesia is used the neurogenic factor is ruled out. Any fall of blood pressure due to sympathetic paresis is of small degree when the spinal block employed is a low one.

If aeffects do occur these can be easily combated by the giving of oxygen, and methidine (fifteen mgms) by the intravenous route.

In the operation on the patient, the anaesthetic used was gas, oxygen, and ether. It is important that though the patient's condition was extremely good during the operation, immediately the anaesthetic was stopped his condition deteriorated, and marked signs of shock appeared, and required blood and oxygen in treatment.

There are three main types of operation done for the removal of a growth from the rectum:-

- I. Perineo-abdominal method.
- II. Abdomino-perineal method.
- III. Perineal excision.

It is reccomended by the majority of people that a preliminary colostomy should be performed about ten days before the big part of the operation. By doing this operation the surgeon is also able to judge the extent of the growth in the rectum, and as to whether it is operable or not, and if so as to what type of operation is the best.

In the present case due to the apparent fitness of the patient, and the appearance of the growth, it was thought advisable to rule out the colostomy stage, and do it with the big operation.

Professor C.A.Pannett says that he seldom does a colostomy before operation. The lower part of the bowel formed in the colostomy becomes inextricably adherent during the first and second stages if given any length of time.

Great discussion has occurred in the past in regard to the question as to whether the anal sphincters should be safeguarded. Professor Hartman popularised this technique, but Professor C. Grey Turner, though stating that perfection of the sphincter occurred, but malignancy was inclined to remain, even though growth was said to be upwards.

Mr. T.M. Millar (Edinburgh) carries out the operation of anterior resection where the tumour lies in the rectosigmoid region, but only after a direct examination of the tumour and its metastatic spread. (Lancet, Oct. 1947). Professor Pannett says that where possible the preserving of the sphincters made the operation easier, and less shocking to the patient.

Figures from various clinics suggested that the type of operation performed by Ernest Miles, could produce only fifty per cent cures for five years.

Mr. O.V. Lloyd-Davies of St. Marks Hospital states that there is a high local recurrence in cases which have been done without the colostomy.

On the whole it is rather suggestive that at the moment, the complete removal of the rectum, anus and the surrounding tissues is the safest, and have a permanent colostomy. It is impossible to state accurately even at operation, surely, as to the distant borders of the tumour growth, though the growth is supposed to be upwards, and leave the anal sphincters which are situated so close and must be easily affected, even if only recognisable microscopically. The Abdomino-perineal method was the generally accepted operation for a long time, but it had a rather high mortality rate, due to its greater causation of shock, and now appears to have given way for the Perineo-abdominal method.

The Perineo-abdominal excision is done first with the patient usually in the left lateral position. By means of an incision starting from the side of the base of the sacrum, and carried forwards in the mid-line, surrounding the anus, the rectum is come upon.

The rectum is then freed anteriorly by scissors and gentle gauze dissection. It is then freed laterally, and posteriorly. The rectum is now freed further up, and when it is completely free, it is pushed up into the pelvis.

The peritoneal floor is now repaired from below. The perineal wound is then stitched after of one or two half inch drainage tubes.

The patient is now placed in a moderate Trendelenburg position. The abdomen is opened through a lower right paramedian incision. The rectum and pelvic colon, etc., are freed from above and a left iliac muscle splitting incision is made, and the pelvic colon and rectum are brought through it to rest on the abdominal wall. The pelvic floor is now repaired fully. The appendix may now be removed also if it has the appearance of being unhealthy.

The paramedian incision is closed, and the left iliac incision closed in layers around the emerging colon.

After division of the pelvic mesocolon, and the bowel, the pelvic colon, rectum, are removed, and then we have a colostomy left.

All wounds are now given adequate dressings.

This operation may be done in two stages, i.e. with a colostomy as the first stage. However this adds greatly to the risk of sepsis.

The Abdominal-perineal method of removal is approximately a reversal of the previous method, though here it is usual to do a colostomy first, and the second part ten days later.

The Perineal excision alone is occasionally used. Here again a colostomy is done first. The patient is placed in the left lateral position, an incision is made along the natal cleft to one side of the anus. The coccyx may have to be removed, and the bowel is then freed from the surrounding structures by blunt dissection. As much fat as can be removed is aimed at. The bowel is then pulled down, and removed usually three to four inches. The levator ani are sutured around the remaining bowel, and the wound closed with drainage, usually the wound being packed with plugs of gauze in paraffin. A larger operation on these lines is that stated by Lockhart Mummery.

We have thus three different types of operation. Two of them are very similar except that they are the reverse of each other.

Many things go to decide whether an operation is the best. These include the age of the patient, the local spread of the growth, and whether there are secondaries. Another important factor is the mortality rate of the operation.

The age of the patient plays a large part, as naturally the older the a person gets, the worse he will be likely to stand up to the operation.

Connected with this factor is the spread of the growth. If it has spread out among the tissues locally, it is likely to make it more difficult to free the rectum, and in fact it may be impossible, and part of the tumour tissue may have to be left behind. The presence of secondaries, e.g. in the liver rather makes the situation worse, as they only occur usually late in its growth.

The mortality rate may perhaps be regarded as an index of the success of an operation, though of course, the other factors already mentioned must really be brought in too.

The perineo-abdominal method is regarded as being easier to perform as compared with the abdomino-perineal method, and thus the less shocking. Nowadays the two parts of the operation are carried out by two surgeons working together, and thus completing the operation quicker, and it seems to be less shocking to the patient.

The abdomino-perineal method is regarded even in expert hands as having a high mortality rate, and stated to be even as high as twenty per cent. It is a severe operation, and would appear to be only advisable on very fit people.

The perineal excision is mainly for growths which are low down, and here it may be possible to leave the anal sphincter, though if there is any doubt at all, it should also be removed, leaving a permanent colostomy.

In very advanced cases, a colostomy is usually all that is possible.

Radiation treatment for rectal carcinoma is very rarely used nowadays due to many discomforts it causes the patient afterwards. General dissemination may occur from the growth, or great destruction in the area of normal tissue can easily occur. If any success is obtained, the patient never seems to survive any satisfactory length of time.

The operation carried out on the patient was similar to that already described under the Perineal-abdominal method. It did however differ in certain respects. The first and most obvious is the placing of the patient. The patient was lying prone in the Trendelenburg position, while the usual is the Left Lateral. With the left lateral, we have less movement in changing the position of the patient in doing the second part of the operation. The more the patient is moved the more is the effect on the blood pressure, because when a person is moved during an operation, the movement may cause a drop of twenty to thirty mms Hg. in the blood pressure.

The other fact is the use of a rubber glove as a drain. This fills up a large part of the space left, and offers a wider area for drainage.

The operation was very satisfactory, and the patient's recovery was reasonably quick.

Complications.

The complications of the operation for removal of the rectum may be divided into the early and late.

1. Paralytic Ileus. This is more likely to occur with a major excision, i.e. abdominal-perineal excision, and probably due to the increase in intra-abdominal manipulations which are necessary.
2. Intestinal Obstruction. This is mainly due to adhesions after the operation, and usually affects the small bowel.
3. Peritonitis. This usually occurs after an operation where intra-abdominal work has been done. Another type is where a growth has spread locally, and thus the peritoneum may become affected when the tumour growth is removed.
4. Perineal Wound Infection. It is a great possibility due to the fact that faecal contamination can easily occur from the bowel. Thus a clean bowel, and the use of sulphonamides prior to operation help to avoid it.
5. Haemorrhage. Slight reactionary haemorrhage is a reasonable common occurrence. The bleeding is reckoned to have come from the middle sacral, and middle or inferior haemorrhoidal vessels.
6. Urinary Infection. It is more likely to occur in men who have prostatic enlargement, and also if a catheter is passed.

7. Retention of Urine. This is either due to prostatic enlargement, or to damage to the nervous supply of the bladder during the operation.
8. Pulmonary complications. These are usually due to the anaesthetic, and are usually bronchitis, broncho-pneumonia. Pulmonary embolism may also occur. The late complications are mainly two in number:-
1. Perineal Fistula. This is a mucous fistula in the perineum, which takes place occasionally after a perineal excision.
 2. Sacral Hernia. This occurs sometimes in a progressing manner, and would appear to be more common in women.

Post-Operative.

Post-operative treatment includes the care of the colostomy. It is usually a few days before the colostomy starts to work, and it may need a gentle laxative, and oil inserted into the colostomy. Some people insert a Paul's tube into the colostomy, and allow it to drain through it for a few days, when it usually falls out. In other cases the bowel movements pass into dressings.

Special belts are manufactured and can be obtained for the use of a colostomy. These belts may just be a belt which holds a dressing over the colostomy, or have a little cap with a dressing in it over the colostomy. At first colostomy movements are irregular. They however do settle down, and can be got to move once a day, usually after breakfast, if care is taken. The patient tries to avoid all substances in his diet which would give him a loose stool, and thus tries to take a low residue diet.

The patient had a very satisfactory post-operative period. His only trouble was the very slow healing of part of his perineal wound. As already stated under complications of the operation, it can occur quite easily. Even with the care taken over the patient's bowel he still developed this infection which healed up very slowly.

The colostomy was very satisfactory though it has got considerably smaller, but however is still moving regularly each day.

The patient's recovery was so good that he was able to return to his work, which was of a reasonable heavy nature.

Prognosis.

The prognosis of a case of carcinoma of the rectum is dependant upon many factors, They include the type of growth, and how far it has advanced, i.e. whether there are secondaries to lymph glands, which is important in this type of tumour, from its position, and also to other organs, e.g. the liver. Other factors include the type of operation, the abdominal-perineal method being a more severe operation. A large part depends on the skill of the surgeon, who may ruin a satisfactory operation. Then we must allow for the age of the patient, and his general condition.

Conclusion.

Certain conclusions may perhaps be made from this case. We find that it was only because of the appearance of blood in his stools that caused the patient to come to a doctor, and see about his complaint. He had had constipation for so many years that he never troubled over any change in his bowel actions. He showed quite a typical rectal carcinoma. In this disease a large part of the success of the operation would appear to depend upon the pre-operative treatment of the case, both from the point of view of the patient's condition, but also from the state of his bowel from the bacterial point. The operation of choice seems to be the Perineal-abdominal removal of the rectum, as it is less shocking to the patient, etc., and especially of its reduced mortality rate in unskilled hands as compared with the other type of removal.

Other forms of treatment of this disease are inclined to be useless as though they may remove the disease they cause certain troubles themselves.

The point as to whether there should be a colostomy or not, appears to be still unsettled but the majority would rather prefer the complete removal in case there is any spread that they do not observe.

The prognosis in this case would appear very favourable, as during the time which has elapsed since the operation he has kept very well, and his colostomy is working very well.

CASE. NO. VI.

A CASE OF BURNS.

ITS COURSE AND TREATMENT.

Name. William Mooney.

Age. 15 years.

Occupation. Schoolboy.

Address. 9, Craigmillar Castle Gardens, Edinburgh.

Doctor. -

Admitted. 11th. May, 1948.

Died. 12th. May, 1948.

Complaint. Burns of the Body.

History.

Present.

The patient was brought to Surgical Out-patients of the Royal Infirmary, Edinburgh, by the Police at approximately 7.15 p.m. The patient was stated to have been playing with another boy, when they had discovered a small pile of gunpowder. Mooney had bent down and had thrown a match into it.

An explosion had taken place, at approximately 8.20 p.m. and Mooney and his friend had received burns. The patient was semi-comatose on admission.

Past. Nil.

Social Conditions. Nil.

State on Examination.

Intelligence. -

Development. Fair.

Muscularity. Fair.

Nutrition. Fair.

General Appearance.

The patient when first seen was difficult in deciding as to what sex the patient belonged. It was the fact that the patient was wearing boys clothes that gave any pointer. The patient was in a semi-comatose condition. The hair of the patient was practically burnt away, only a small part was present, and it was frizzled.

General Appearance. (cont.).

The patient's face showed signs of burning, as did the front of his clothes, and his legs. There was a strong smell of burnt cloth and flesh about him.

Temperature.

This was 98 degrees F. on admission.

Pulse.

This was 104 per minute on admission.

Respiratory Rate.

This was 22 per minute on admission.

Blood Pressure.

Though this was taken I can find no recording of it .

EXAMINATION OF SYSTEMS.

Circulatory System.

Certain results were found at the first examination, but it must be remembered that the patient was semi-comatose, and thus the full results, and proper examination were not obtained till later.

Dyspnoea. There was slight dyspnoea on admission.

Palpitations.

None.

Pain. None.

Faintness. The patient felt slightly faint.

Arteries.

Pulse. On admission it was 104 per minute.

Rhythm. Steady.

Force. Strong.

Systolic. Below average.

Diastolic. Below average.

Nature of the pulse wave. Regular.

Nature of the vessel wall. Not palpable.

Blood Pressure.

There is no recording of it.

Veins. No abnormality.

Capillaries.

There is no cyanosis, or dropsy.

Heart.

Form of the Praecordium.

No abnormalities.

Pulsations.

None either in the Epigastrium, upper part of the Sternum, or in the Neck.

Palpation. The apex-beat lay in the 5th. intercostal space, within the mid-clavicular line.

Percussion.

On percussion the heart showed no enlargement.

Auscultation.

Mitral. All the heart sounds are
Tricuspid. easily heard and are
Aortic. quite normal. There are
Pulmonary. no murmurs present.

Rate of the Heart. Fast.

Rhythm. Regular.

The pulse is present.

Respiratory System.

Cough. No cough.

Expectoration. None present.

Haemoptysis. None.

Breathlessness. Some on admission.

Pain. None.

Signs.

Breathing.

Rate. This was 22 per minute on admission.

Type. Abdominal-thoracic, and slight use of the accessory muscles.

Rhythm. Regular.

Sputum. None.

Thorax.

Inspection.

The chest was of a normal shape. It was not very well covered. There are no local or general departures from normal.

Palpation.

The movements are equal, and of good expansion.

Percussion.

Equal, and resonant in all areas, and on both sides.

Auscultation.

Breathsounds. Normal.

Accompaniments. None.

Integumentary System.

Face. The whole surface was superficially burnt.
The eyes were not yet closed.

Hands. They were almost all covered with superficial burns. The palms of the hands were however burnt deeper than the rest.

Legs. They were burnt superficially, mainly over the ankles and feet. The thighs were clear, but the top of the thighs and a small area of the scrotum were burnt slightly.

The rest of the body was clear.

The hair had been very badly burned but the skin surface was not harmed.

Haemopoietic System.

Spleen. No enlargement.

There were no blood or bacteriological examinations carried out.

Alimentary System.

Appetite. -

Thirst. The patient was very thirsty.

Dysphagia. No difficulty in swallowing.

Pain. None.

Feeling of weight. None.

Distension. None.

Flatulence. -

Heartburn, Waterbrash, and Nausea. -

Vomiting. None.

Action of the Bowels. -

Signs.

Lips. They were reddish in colour, and dry.

Tongue. It was reddish in colour, and dry.
Teeth. -

Abdomen. General.

The abdomen moves freely, and there is no pain
present.

Palpation. No abnormality.

Percussion. No abnormality.

Rectal examination. -

Urinary System.

There is no pain in any part.

Micturition.

Normal.

Kidneys. Not palpable.

Urine. Very little passed. Concentrated but no abnormality.

Endocrine System.

No abnormality.

Nervous System.

No abnormality.

Locomotor System.

No abnormality.

Reproductive System.

No abnormality.

Non-operative Treatment.

General Shock Therapy. Plasma.

Penicillin. 50,000 units, four hourly.

Eucortone. one cc. four hourly.

Operation.

11th. May, 1948.

Surgeon. Mr. Ross.

Anaesthetic. Cyclopropane,
Oxygen.

Nature of the Operation. ' Surgical Toilet of Burns '.

The areas involved were cleaned with 1% aqueous solution of Cetavlon and dried. Penicillin powder was then applied to the areas and Tulle gras applied. Dry gauze swabs were then applied and firm bandaging done.

Progress after the Operation.

11th. May, 1948.

The patient was given plasma, and saline intravenously after the operation. The patient's temperature at 11 o'clock had risen to 100 degrees F. and his pulse had risen also considerably. His condition however appeared satisfactory.

12th May, 1948.

By three o'clock in the morning the temperature had risen to over 102 degrees F. while the pulse was now about 100 per minute.

The patient never recovered consciousness after the operation. The swelling of the tissues from the burns became more apparent.

The temperature gradually rose still higher, first to 104 degrees and then to 105 degrees F. The pulse meanwhile was unable to be taken at the wrist and the apex-beat was used. This was somewhere in the neighbourhood of 100 per minute.

By the afternoon his respirations became more difficult and he was still unconscious. His condition gradually became worse, and he died at 8.15 p.m.

This patient, William Mooney, aged 13 years, was admitted to ward 6 of the Royal Infirmary, Edinburgh, after he had put a match to a pile of gun-powder lying on the ground. The gun-powder exploded into the patient, and he received burns. On admission he was in a shocked condition, and received plasma and saline, to combat this shock. Later that evening he was taken to the theatre and his burns were examined and found to covering the body surface to an extent of fifty per cent. These were mainly superficial in nature. They were cleaned with cetavlon, and penicillin and tulle gras applied. The patient was returned to bed, where plasma was continued. The patient's condition deteriorated rapidly after the operation, his temperature slowly rising, and his pulse also. He never recovered consciousness after the operation. He became worse during the following day, and towards the evening his respirations became more difficult, and he died at 8.15 p.m.

Discussion.

In this discussion I wish not only to discuss the types of burns received by the patient, and the complications which followed, but also burns of other parts of the body, and their treatment.

Burns are produced by the application of dry heat to the body surface. Thus we are able to differentiate between scalds, which are the result of moist heat, and are closely associated to burns, and burns themselves, though difficulty may arise in their milder forms. Their results may be compared to that of 'roasting' for burns, and boiling' for scalds.

A variety of agents are mentioned as the cause of burns. These range from excessive heat, cold, electrical currents, x-rays, to chemicals.

In this case the boy had come across a pile of gunpowder lying on the ground. On seeing this pile, he had struck a match, and bending down had thrown the match onto the pile. Immediately the gunpowder exploded, with a terrific burst of flame, up into the child's body. Thus we have as the cause of the burns, actual flames, and excessive heat.

As a general rule in a case of burns, cutaneous surfaces are affected, but occasionally other parts of the body are affected, such as hair, and the respiratory passages, which could be burned by anaesthetic gases catching fire, and passing down into the respiratory tract.

During the last forty years, the number of fatal cases has gone down, though even now the number is surprisingly large. The majority of burning accidents occur in civil life, and arise in nearly every case out of an accident in the home, which could have been prevented by simple precautions. The number of fatal accidents has increased by seventy five per cent. in elderly in the past forty years, while the deaths in children have gone down, but are yet alarming in size.

In the house you have many appliances, which can cause a burn or a nasty scald. Open fire-places, electric fires without guards, and badly placed pots of boiling water are tempting items, specially for young children. The universal cigarette cannot be exonerated. The wearing of different types of manufactured clothes must not be forgotten, inflammable cotton, and silk clothes, especially, are quite liable to catch fire.

It has been calculated that with greater care, ninety per cent. of the burning accidents could be avoided. From the ages of persons, and times of accidents, it was noticed that most accidents occurred after two p.m., while the later the day got, the younger the patient.

A large part of this was said to be explained by children being left alone, in charge of an older child, while the parents go out. These cases constitute a large problem in the prevention of cases of burns.

Various classifications have been put forward in the past number of years, and these are summarised in the following table. (Surgery Lectures 1948-1949).

Dupuytren	German-American	Degree or skin destruction	Scottish
Ist. degree - erythema	Ist.degree		
2nd. degree - vesication in the epidermis	2nd.degree	Partial	Superficial
3rd. degree - vesication between epidermis & corium. Involvement of corium			
4th. degree - involvement of sub-cutaneous tissue			
5th. degree - involvement of muscle	3rd.degree	Complete	Deep
6th. degree - involvement of bone			

Dupuytren has classified burns in a finer degree than the others. He has used the effect of the burn upon the different layers of the skin. The German-American was introduced by Hebra. Here you go by erythema, skin still present and the amounth of skin destroyed.

The skin is composed of the epidermis or cellular layer, and the underlying dermis or true skin. The epidermis consists of the Stratum Germinativum, the basal layer, and then the Stratum Mucosum, the prickle cell layer, and the Stratum Granulosum granular layer, the Stratum Lucidum, clear layer, and the Stratum Corneum, the horney layer. Below these lie the dermis. Associated with the epidermis are its derivatives the hair follicles, the hairs, sebaceous and sweat glands, and the nails. The dermis has the lymphatics, nerves, and the blood-vessels. Below the skin we have the layers of fascia, muscles, bone, and the othersorgans of the body.

The skin is just as sensitive to high temperatures as are other tissues of the body. The temperature has a relation to the lenght of time the heat has been present. Thus when the duration is between I-5 seconds, and a temperature about 55 C - 60 C, erythema of the skin is produced, temperatures between 60 C - 85 C produce vesication in the epidermis, and temperatures between 85 C - 100 C produce vesication between the epidermis and corium and penetrate to the corium, while temperatures of 100 C and over destroy the entire depth of the skin and penetrate to the deeper layers.

If you increase the duration of your heat, you will get a more severe burn even if your temperature is low. In an explosion, where you have a high temperature and exposure for only a part of a second, you get a superficial burn. Here a gaseous layer is formed between the epidermis and corium, and prevents a deep penetration. Blister formation occurs after exposure to a lower temperature. When heat is directed upon the skin, the tissue protein is coagulated, the amount depending upon the amount and duration of heat. Thus cells in the different layers of the skin become affected, some being killed outright, while others are damaged to varying degrees. The capillaries and venules in the area are widened, the flow of blood in them is at first hastened, and later slowed, and some cellular elements of the blood are extravasated, and in a surrounding zone, the arterioles are dilated.

The fluid accumulates in the extravascular spaces from the very small vessels, and though some is reabsorbed by lymph channels, a large amount remains free. The different reactions of the skin as shown by Dupuytren may perhaps be taken in order.

The Erythema is caused by a dilatation of the small vessels, and remains for days. For the first two days there is a certain amount of exudation due to the vessel walls being damaged. This fluid softens the outer epidermal layers, which are cast off in the form of scales, as the erythema subsides. The next effect of heat is that of Vesication. This takes time to occur and consists of fluid in the deepest layer of the epidermis. Sometimes the fluid gathers between the epidermis and corium, and the papillae are exposed in the floor of the blister. The cells of the raised epidermis, i.e. the layer above the fluid usually undergoes necrosis. The fluid which was at first clear, now becomes cloudy, and later yellowish as the cells pass into it, and may even clot. Thus we have had the formation of a blister, which usually ruptures, and leaves a raw surface. Fluid is continually exuded from the surface for about thirty-six to forty-eight hours. Instantaneous detachment of the epidermis may occur and is produced by momentary exposure to a high temperature. The epidermis can be peeled off.

The whole skin may be destroyed if the heat is excessive and has been kept up for a long time. The skin may be split to expose the subcutaneous tissue. Usually however the epidermis remains firmly attached, but if the epidermis can be removed the surface thus exposed is most frequently grey, and opaque, but occasionally the subjacent corium acquires a mummified appearance, of a light brown colour, and semi-transparent, and through it the dark blue outlines of thrombosed subcutaneous veins are clearly visible.

Destruction of structures of the subcutaneous layer does not often occur, but is more likely to occur on the hands and feet, though other structures deep in the body may be affected with severe consequences.

In the healing of a superficial burn you get a separation of the dead layer of tissue, and re-epithelialisation occurs from the sweat, sebaceous, and hair follicles, and epithelial tufts, and thus you get a normal skin layer back.

In a deep burn we have these various parts destroyed, and thus separation of the dead layer occurs by a growth of granulation tissue between the dead, and living tissue. Thus we have a slough, and a raw surface. It heals by an ingrowth of epithelium from the edge. The healed tissue is not skin, it is only scar tissue, as there is no sebaceous glands, etc. present.

We must now consider the fact that a wound may not heal without any infection being present. All infected burns are serious. A burnt area which has come into contact with dirt, or such like substances, must need be infected. An important point to remember however is that burnt skin, and scorched skin are usually sterilised by the burn, and thus if the burn is not disturbed less infection is expected to be found on the burnt area, and this is the case. If a patient is brought into hospital without previous disturbance, you can get *Staphylococcus Albus*, but if first-aid has been rendered then all types of organisms can be obtained.

In hospital you find Haemolytic Streptococci on the surface of the wound, and when the slough separates coliform bacteria appear.

Amongst these organisms the Haemolytic Streptococci are perhaps regarded as the most dangerous. Thus great care must be taken in the treatment of a burn due to the raw area presented to a bacterium, and the necrotic tissue, and thus food for it to live and thrive on.

In a report issued by the Burns Unit, Birmingham, on a survey of infection of burns, that certain organisms were obtained from the burnt area at various times.

These included some of the following - Haemolytic Streptococcus (Group A). Of cases admitted 3.9% were infected with this organism, while after admission 5.4% acquired it.

Ps. pyocyanea.	1.8% on admission.	and 8% after admission.
B. Proteus.	0.8% "	and 12% "
Staph. Aureus.	3% "	and 60-70% "

Infection by Haemolytic Streptococci other than Group A and by and Streptococci. occur very infrequently.

B. Tetanus never occurred.

Thus it would appear that any danger lies mainly from Staph. Aureus, and it is probably due to its presence in the patient's noses, and in skin tissues other than the burns.

We have up to the present concentrated upon the local signs of the burn itself. No matter how severe these are, general signs are also shown.

The patient on receipt of the burn reacts at first in a similar way to an injury of the body.

First we have Primary Shock. This is a central affair, and is regarded as being vaso-vagal. It is associated without the loss of blood. The blood-pressure falls, and the pulse becomes slow. This act is brought about by the carotid sinus. With rest, improvement occurs, and recovery becomes complete.

However when you have a burnt area of reasonable size, as already mentioned you get an exudation of plasma into the extravascular spaces. The lymphatics are unable to absorb it all, and thus part is lost to the general circulation. We thus pass from the stage of Primary Shock into the stage of Secondary Shock, or Oligaemic Shock, where the difference between Primary and Secondary is that in the Secondary type we have fluid loss. The body is capable of compensating for this body loss for a time by vasoconstriction in other organs, especially in the splanchnic area, thus an adequate flow to the heart is kept up. The falling blood volume can be recorded by a rising diastolic pressure and a slowly falling systolic level. If treatment is not started the blood volume becomes so reduced that it is found that in cases where the systolic pressure falls below 80mm Hg., and then treatment is then started, it is a failure. It would appear that the vital organs had gone without a satisfactory volume of blood when this systolic pressure is reached. Changes occur in the blood itself with this shock. As plasma is lost, viscosity changes, and corpuscular concentration of the blood occurs. The main changes in the blood chemistry are a shift of sodium, and chlorides from the plasma to the cells, and a similar shift of potassium from the cells to the plasma. A rise in blood non-protein nitrogen and a fall in the blood carbon dioxide also occurs. These changes are however not constant.

The abnormal permeability of the minute blood vessels, which are exuding fluid usually persists for about thirty-six to forty hours, after the time of injury, though probably mild after the first twenty-four hours.

Fluid is soon absorbed after this, and the blood volume soon returns to near normal though the factors concerned with the blood picture, e.g. the blood corpuscles may not be normal.

The total protein concentration of fluid in the burn is always lower than that of the plasma; more water than protein is lost from the capillary into the wound. The initial change in the residual circulating plasma is therefore an increase in concentration of total protein. This more concentrated plasma presumably exerts an increased colloid osmotic pressure in the unburned regions of the body. Following resorption of water from unburned tissues and fluid therapy, this increased concentration of the proteins of the residual plasma is replaced by a dilution.

The initial increase in protein concentration and osmotic power of the circulating plasma is not encountered following haemorrhage of whole blood where the entire plasma is lost. For a given loss of water from the vascular bed, that is for an equal reduction in blood volume, the undamaged tissues of the burned patient face a more rapid dehydration than those of the patient following a haemorrhage.

This points to the urgent need for the replacement in a case of burns.

However not every case shows improvement, and in some cases either before or after the shock has passed off, severe constitutional disturbances occur.

Certain features appear. The temperature shoots up, and delirium occurs, albuminuria oliguria, and tachycardia, and a general progressive weakening of the heart's action. The blood chemistry differs little in that from shock in that the fall of plasma proteins, and the rise of blood urea are more pronounced, and that the icteric index is raised. The blood pressure may fall.

Post Mortem findings show changes in all the organs of a degenerative nature, and especially in the liver, and the renal tubules are also severely damaged, and in some cases there is swelling, congestion, and even haemorrhage in the supra-renal glands.

These symptoms and signs have been given the name of "Acute Toxaemia".

As to the cause of this toxaemia, not one reason appears to be generally accepted. It would appear to be unconnected with shock, as some cases appear after the patient has recovered from shock or, shock has not been present. Perhaps prolonged oxygen want is the cause aided by a decreased blood volume at one time. Some workers believe that it is a supra-renal exhaustion, or due to an elevation of the blood potassium level, or absorption of autolytic products from the burned tissues. This last cause has got some backing. Perhaps a similar toxic breakdown product may occur in the skin, as does in muscle in the "Crush Syndrome". It would appear to be more of a toxic factor due to the temperature, pulse, and respiratory rate increase.

Local applications being absorbed at one time, were regarded as a cause, namely where tannic acid was used, but it appears where treatment is of a different kind, and non-absorbent.

If the patient does not develop "Acute Toxaemia", he may develop a toxaemia from gross infection of his wounds, and he may die from it.

If none of these take place, healing will occur.

Professor Wilson has divided the clinical course of a case of burns into five stages.

1. Vaso-vagal. This may or may not be present. It usually lasts only for a few hours, and recovery is spontaneous. The patient is pale, grey, and may be unconscious. He is restless. The temperature of the skin is cold, the pulse slow, while the blood pressure is low, and vomiting may even occur.

2. The second stage is that of Secondary Shock. It may start within half-an-hour or later. The worst part of it is during the first twelve hours, and it lasts for about thirty-six hours. The patient is pale, cyanotic, grey in colour. The temperature of the skin is reduced. Sweating may be present, and is a bad sign. The mental state is at first alert, but gradually becomes worse and may pass into coma. The blood pressure falls, first the systolic, and then the diastolic. About twenty five per cent. of children however show a rise in blood pressure. This rise may be up to 140 mms.Hg., and great care has to be taken here. Haemoconcentration is present and may be up to 120%. Urinary output is decreased.

3. The third stage is that of "Acute Toxaemia". This comes on between six to sixty hours after the accident. As already mentioned the symptoms are Pyrexia, Vomiting, Delirium, casts in the urine, tachycardia, and increased respiratory rate. This stage usually leads to death.

4. The fourth stage is that of "Septic Toxaemia". Here the patient shows signs of an infection being present in the body. Pyrexia, tachycardia, etc.. It usually comes on after twenty four hours.

5. The fifth stage is that of Healing. This depends upon the size of the burn, as to whether any complications have taken place, such as infection.

Treatment.

The treatment of a case of burns has been carried out in many different forms over the past number of years. It has ascended from a simple method of treatment, by that is meant an easy, uncomplicated way, to an advanced method where the treatment is more of an art. This art is to be met with in the special units, where only cases of burns are dealt with.

It is however alright to have these fine methods for treatment, but unfortunately many cases are treated in places, perhaps quite unsuitable, where such treatment may not be carried out.

To show the treatment of burns, let us take a suitable case, where the patient has burns of a moderate extent, and degree, and give a suitable method of treatment, and as to how it may vary.

The patient is admitted to hospital because of the extent of his burns. He is then put to bed. This may be in a general surgical ward, but in some places there are special rooms which have controllable heating, or in a special tented bed.

The patient is in a stage of shock usually on admission, more often Primary, i.e. Vaso-vagal, though if there has been great delay in his transportation to hospital or his burns are very severe and extensive, he may have progressed further into a stage of Oligaemic shock, and be far advanced in this even. We will presume that the patient is in the stage of Primary shock.

The patient is thus given heat. This is a thing that must be carefully watched. It must not be drastic in nature, applying hot-water bottles, and electric blankets, and shock cages can have very dangerous effects by causing vaso-dilatation to a perhaps already weakened circulation, where vaso-constriction is wanted.

The burnt areas are now examined, not thoroughly, but sufficient only to tell if they have been so severe to need very urgent surgical treatment. The areas of the burns should be covered with sterile cloth if possible.

We now record the pulse, temperature, respirations, blood pressure, and haemoglobin estimation is done. It is from these that we can decide as to the state of the patient's general condition, and as to whether certain treatments will be necessary. The patient will require some sedation probably as burns are very painful, being on the whole raw surfaces. Before administering a sedative such as morphia, it is advisable to enquire as to whether the patient has received any before admission, and if so as to the quantity, because if he has received a certain amount, and you also give an amount, the patient because of his shocked condition may not absorb it all generally, and when his condition improves, he thus receives a massive quantity of morphia into his circulation, and with probable harmful effects. The dosage of morphia varies, some people recommend $\text{gr}\frac{1}{4}$ for an adult immediately, and if it fails to relieve the pain it may be repeated after one hour from the previous injection. Others say that it is dangerous to give such a dose, and that $\text{gr}\frac{1}{6}$ is a suitable dosage.

At this point the patient should be left for fully thirty minutes. Before doing this, it is of great benefit if the patient can be made to take some fluids by the mouth.

After this period of time has elapsed, once again the pulse, temperature, respiration and blood pressure, and haemoglobin are again taken. Even if the arms are burned it is still necessary to take the blood pressure, and in order to do this the burnt area is kept covered with thin sterile material. We should also note the patient's mental condition, i.e. as to whether he is completely conscious or whether partly comatose.

A full estimate of the burns may now be made if conditions are suitable.

Some of the outer garments may be removed now, but dressings should be immediately replaced after inspection, and it is stated that no large area of skin should be exposed at one time.

From our recordings now, and also those taken thirty minutes previously, it is possible to judge with a fair amount of accuracy the patient's condition in regard to shock. If the blood pressure is normal, preliminary transfusion may be omitted. However it is usually found that it is better to use the haemoglobin estimation as a guide. There is a great difference of opinion on the point as to whether the haemoglobin is of more value than the blood pressure. However it would appear that in an adult the blood pressure is the best, while in a child the haemoglobin is the best. Here if the shock is increasing, i.e. passage into Oligæmic shock is taking place, the haemoglobin will go up above the normal, due to plasma being lost from the tissues. Thus to combat this loss, two substances may be given by transfusion:-

I. Plasma.

II. Blood.

As it is plasma that is exuded from the burnt tissues, it is only natural that plasma should be given. This helps and prevents the low protein level which occurs after three to four days, which may still occur if the burns have been very extensive, even if plasma has been given.

If blood is given we are also giving plasma, and thus combating the protein level fall, but as well we are giving red blood cells. This latter part seems to prevent the anaemia which usually develops after a few days, and thus if blood is at hand it is better to give it, after grouping and suitable cross-matching of the blood. Mr. A.B. Wallace recommends that eight grammes of sodium bicarbonate be given orally for every pint of blood, and that one pint of blood be administered for every two of plasma. This view is supported by Evans and Bigger.

He has put forward a method of calculation for the amount of blood or plasma or both to be given to a patient.

In an adult he recommends transfusion if fifteen per cent or more of the body surface is involved, and in children ten per cent. If the blood pressure is normal in adults, he gives one pint of plasma within a space of twenty minutes, followed by a second pint of plasma, and a third pint of blood at a slower rate.

When the blood pressure reading is below normal, two pints of plasma are given rapidly, and blood and plasma continued slowly till the blood pressure becomes normal, when plasma is continued for a further twenty four hours.

In children he uses the haemoglobin mainly, though also watches the pulse, temperature and respiratory rate, and blood pressure closely. Calculation is made as to how much the child has lost, and this amount is given to the child plus the amount that would be lost during the time of giving this amount, e.g. if the child had lost two hundred ccs. and was losing at the rate of about fifty ccs per hour, and thus in the first hour the child would receive two hundred and fifty ccs. The amount to be given is thus calculated at hourly intervals.

Care must be taken during transfusion of an adult or a child that they do not receive too much, and that they become known as 'waterlogged'. Thus careful examination of the chest, and neck veins etc., should be carried out. It is advisable to have the patient put on a fluid intake and output chart daily, and also to carry out ordinary microscopical examinations of the urine to show any kidney damage.

We have thus treated the patient's general condition, but so far have paid little attention to his burns other than see if they are extensive and need urgent treatment, and cover them with sterile cloths. However in our general treatment we can start the patient on a course of penicillin, and this will help in treating infection of the burns if present.

Before starting the local treatment, i.e. the treatment of the actual burn itself, let us examine the same period of treatment in the case of William Mooney.

The general treatment of the case follows in the main part, the description already given.

He was admitted to the wards about one hour after his burning accident. A very superficial examination of the burnt areas were made, and the more obvious ones were covered with a sterile cloth. He was given rest in bed, general shock therapy, by means of warm blankets, hot-water bottles, and heat cage. This part was followed by the observation of the pulse, temperature respiratory rate, and the blood pressure was taken this once. No haemoglobin estimation was made. After this he was given an injection of morphia grⁱ/₈, and left alone for about thirty to forty minutes.

Up to this point the treatment given partly follows the lines recommended by most people now. However the general shock therapy was perhaps rather drastic, though be of great benefit if kept within the proper proportions by careful attention. We must note that no haemoglobin estimation was done.

At the end of the period of time already specified, observations already carried out before were repeated, excluding this time, the haemoglobin estimation, and the blood pressure. His temperature was about average, while his pulse was thirty beats per minute above average, and his respirations were also increased. Thus we had a patient who appeared to be progressing in the stages of shock, and would appear to have left the primary shock, and was showing the signs of oligæmic shock.

To combat this the patient received plasma. This was given as one pint at eight fifteen p.m. at a moderate rate, and was followed by a flask of saline. (400ccs), and then by more plasma. There was no blood given at all.

The patient was started on penicillin, 30,000 units four hourly, and also eucortone one cc four hourly. The penicillin is to combat infection, either any present or likely to appear in the future. The idea of the eucortone was that it may help in the control of sodium, potassium, and water changes in the body. This idea is however regarded as being useless.

We have now covered the general treatment of the case and prepared him for treatment of his actual burns, which was carried out in the operating theatre under sterile conditions at ten fifteen p.m.

The treatment of a case of burns should only be done when the blood pressure is stabilised.

The treatment of the actual burn has varied a great deal during the past number of years. Some of the drugs used have been given up, due to various reasons, some because of toxic effects shown by them, and others because they have been superseded by drugs whose actions appears to be more superior.

This local treatment is best carried out in a well heated operating theatre under strict aseptic conditions. Some of the special burn units have rooms which are used for nothing else but the treatment of burns, and the air is kept free as far as possible of bacteria by special ventilation and bacteria traps.

The patient should be given a general anaesthetic if possible. Full deep surgical anaesthesia is not required, and is not wanted because it would further increase the shock in a patient who is very susceptible to shock. Cyclopropane, and oxygen are by far the best, and may be given by endotracheal tube if possible. If it is not possible to give cyclopropane, which needs a closed circuit apparatus, then gas and oxygen may be used with perhaps a little ether if need be. Some surgeons do their treatment under scopolamine, morphia. However no matter how carefully the treatment is done, the local treatment causes great pain, even with adequate morphia, and thus general anaesthesia is best. Some people state that even if general anaesthesia is used, a severe degree of shock if it occurs, can be counteracted.

It is now possible to examine all the burns present, and to estimate their severity, and also as to how much of the body surface is affected. The burns are best cleansed in parts to avoid prolonged exposure, though if two or more surgeons work together the time taken is cut down and causes less disturbance to the patient mainly from the anaesthetic point of view, and exposure of the burns.

The cleansing agent may be either normal saline, soap, and water, if very dirty. A very good one used nowadays is Cetavlon usually in a one per cent aqueous solution. It is a synthetic detergent, cetyl trimethyl ammonium bromide, which apparently reaches the organisms in the depths of the sweat, and sebaceous glands and hair follicles. It has a rapidly lethal action on haemolytic streptococci, and relatively non-toxic.

Its action is impaired however in the presence of blood, and it causes even in solutions of 0.1%, lysis of leucocytes.

Any blisters encountered should be ruptured, though some people do think that blisters should be left alone as if they are touched another raw area is exposed. However they appear to become infected if not ruptured, and it is better to try and avoid this happening in a burnt area, by rupturing them. All loosened and detached epidermis should be removed and special care should be taken to strip off the softened and partially detached at the edges of the burnt area.

The whole burnt area is now dried carefully. It is at this point the road of treatment can be broken up into various directions.

We have thus the following ways.

1. Use of Coagulants.
2. Use of Dye-antiseptics.
3. Use Castor-Oil Emulsion.
4. Saline Packs and Baths.
5. Irrigation with the Stannard Envelope.
6. Glycerin-Sulphonamide Paste.
7. Primary Excision.
8. Treatment in a Closed Plaster of Paris Cast.
9. Pressure Dressings.
10. Exposure Method.

The coagulants and the dye-antiseptics may be taken together. The true coagulants are Tannic acid, ten per cent solution, Tannic acid jelly, and silver nitrate, while the coagulant dyes are the triple dye. (crystal violet, brilliant green, proflavine).

The true coagulants should be used when the sterility of the burned surface is beyond question. The true coagulants combines with, and precipitate cellular protein to form a true coagulum. The coagulant dyes do not combine with the cellular proteins, but dry to form a protection by means of a crust on the burned surface. They have a bacteriostatic action. They form a less rigid eschar than true coagulants, and the eschar is less impervious to infection, but at the same time less resistant to the escape of infection from beneath it.

The burn is given the usual cleansing treatment, and then the coagulum is put on with a swab, and another layer is put on the burn about a quarter of an hour later. As far as possible the surface of the coagulum is exposed continuously to the air under a heating cage, and care taken to try and keep the coagulum dry and unbroken. If cracks appear a coagulant dye is applied. This treatment is continued until the end of the second week when the coagulum begins to separate at the edges, and can be peeled off in areas. When the coagulum is peeled off, a bland ointment is applied for a few days.

If separation has not started by the fourth week, or infection is present, the coagulum should be soaked off. A course of sulphonamides may be given by the mouth at the same time.

This treatment has however partially died out due to various reasons. The first of these is that if infection is present under the coagulum, then there is no outlet for it, and allows absorption of the infection into the general circulation. Another important reason is that serious results have been found with the use of tannic acid. When applied to a large burned surface, it can be absorbed into the circulation in quantities sufficient to cause general poisoning and may produce severe necrosis of the liver.

Silver nitrate may destroy some surviving cells, and thus delay healing. The advantages of coagulants are that they minimise the loss of fluid at the site of the burn, and thus help in combating shock. The burn underneath remains dry and free from infection, if conditions are favourable till healing occurs. The comfort of the patient is assured of for about a week or more, and thus insures a good rest for the patient.

This type of treatment has little to offer now, with so much in the way of safer and as good treatment which has now appeared. If necessary to use it the coagulant-antiseptics are the best.

The Castor-Oil emulsion is a twenty-five per cent. castor-oil in water emulsified by lanette wax S.X. and containing one per cent. sulphanilamide. This emulsion is applied on lint to the burn, after the burn has been cleaned in the usual way. The dressings are changed only after fourteen days. When sloughs and the granulating surfaces are clean, skin-grafting is carried out. This method is good in many ways. Being soft it does not damage the wound when removed. Antiseptic agents can also be used with it. It must however remain as an emulsion otherwise proper cleansing with saline can not be carried out. Lanette wax SX. appears to allow this. The use of it however does not reduce to a marked degree, the loss of fluid at the burnt surface, and thus helps the continuance of shock.

Treatment by Saline Packs, and Baths were popular in some parts during the war. In this method the preliminary cleansing is usually omitted, and the areas dusted with sulphonamide powder, and saline packs applied and kept moist. Saline baths are also given at a constant temperature, when the epidermis, dermis, and exudate are removed by gentle swabbing. The sulphonamide powder and saline packs are again applied. Strict aseptic precautions are needed in this type of treatment.

The advantages of this type of treatment are that the patient can move around and stiffness is prevented, and thus is more comfortable to the patient. Sloughs are removed more quickly and skin grafting may be done easily.

Against this method there is the fact that loss of fluid from the burnt area is not prevented, and the frequent changes of dressings lead to a reasonable easy access of bacterial infection.

The use of this treatment needs careful attention, an adequate staff and apparatus, which can only be done in specific places.

Total immersion itself of the patient, may in the early stages, be followed by a profound constitutional reaction.

Irrigation with the Stannard Envelope follows along the lines of the last method of treatment. The affected part if possible is enclosed in an envelope made of silk rendered watertight by a coating of synthetic resins. Irrigation should be carried out at least once a day, though three times a day is ideal. Bunyan recommends irrigation with a one per cent solution of sodium hypochlorite electrolytically prepared, Milton (one per cent) and normal saline are both satisfactory. At the finish the envelope should be filled with oxygen as it prevents the envelope adhering to the limb. These envelopes are a specialised method of applying open therapy. There are however certain objections to it, the washing away of epithelial debris and sloughs which collect inside them, and an inability to apply dressings, and a difficulty in splinting the part accurately in the position of rest.

Glycerin and Sulphonamide paste is applied direct to the burn, and may be re-applied every second or third day after removal of the previous dressing. The paste has a bacteriostatic action, and has proved useful in cases of burns where they are not very extensive.

Primary Excision and Skin Grafting explain themselves. It has not however been accepted as a common method of treatment, perhaps because people are not inclined to take what appears a drastic method, without having tried a more simple method. In general however it would appear to be only suitable in a case where the burns were few.

Treatment with Plaster-of-Paris Casts may be forced upon the surgeon if the burnt area is in the region of a fracture. It may also be used in areas without a fracture though, here only surely if the burn is restricted to a limb usually. The burnt area is first covered with tulle gras, and then with several layers of dressing gauze. The whole limb is then wrapped in a generous pack of cotton-wool. The plaster cast is applied over this. The cast is changed once a fortnight under anaesthesia, the burned surface is cleansed before re-application of the new plaster. pyrexia for about twenty-four hours after the change of the plaster is regarded as of no consequence.

Pressure dressings introduced by Koch in 1941 have been used in the treatment of burns for many years now. The escape of the plasma from minute blood vessels on or near the surface of a burn may be prevented by applying dressings which exert an opposing pressure. It is similar to the control of haemorrhage from a large area, which is raw.

There are certain advantages and disadvantages in the use of this method.

Advantages. 1. the patient is comfortable.

2. in superficial burns healing has taken place by the first dressing.

3. oedema is limited.

4. return to function is early.

Disadvantages.

1. experience of the details of this method are required.

2. careful attention is demanded for forty-eight hours.

(A.B.Wallace).

There are however further disadvantages, and one is that a large amount of dressing material is needed, and also it is difficult to judge how tightly the bandage should be applied, for a danger occurs to the nutrition of the tissues if the pressure is too great or if it is not uniform.

There is a difference in opinion as to whether the preliminary treatment should be done. It would appear that any aid to the prevention of infection of the wound, or if it is present, to any direct means of tackling it, it would be better to do preliminary treatment. In extensive burns A.B.Wallace does not do the cleansing, but does the pressure dressings and also complete immobilisation. The burn is covered with a bland dressing such as tulle gras, and then covered by several layers of dry gauze, very liberal quantities of teased-out wool, and fixed with crepe bandages to ensure even pressure.

Immobilisation is carried out by means of plaster casts to the part, and in the lower part of the body, a double hip spica may be used. Very careful nursing attention is now needed. The initial pressure dressings are not disturbed for fourteen days by which time superficial burns are healed while deep burns require removal prior to grafting.

It is very difficult to keep the dressings clean, and dry in certain parts of the body, especially in children.

Because of this trouble, mainly in children, Mr. A.B.Wallace, has turned to the open or exposure method.

His principles are as follows:-

1. To keep the raw area dry, and so prevent the multiplication of the surface organisms.

2. To immobilise the part to prevent invasion of the tissues by infecting micro-organisms.

3. To administer Penicillin systemically to counter any tendency to general or local infection.

4. To render nursing care as simple as possible.

The burn is cleansed as previously stated, dried, and dusted with powdered penicillin, and repeated every few hours for the first twenty-four hours at least. It is advisable to leave out sulphonamides from the burnt area, as toxic absorption has occurred in the past.

The burns are not covered but left open to the air. A crust forms on the burnt area, at first light brown, and becoming progressively darker. Penicillin is given in large dosage intramuscularly to combat any infection in the lower region of the burn, and thus allow a proper growth of granulation tissue. This method has given very reasonable results so far. However it must be very difficult in some parts of the country, and also at certain times of the year to keep the burnt areas dry, because it is not possible to keep the majority of surgical wards at proper temperatures, without them becoming stuffy. If the part is to be exposed to the air it must surely limit to a certain extent the size of burn to be treated. The burns may be only superficial, but quite extensive, and the whole body may require to be exposed, which appears rather out of place. If there is also a great loss of fluid from the burnt areas, then during the time when crusting is taking place the treatment of shock may be more severe than if treated by other methods. From the results produced it would appear to depend upon the extent, and degree of the burn as to whether exposure method or pressure method is used. The other methods mentioned are rather unsatisfactory either due to their toxic absorption, or the amount of material needed in their use.

William Mooney was anaesthetised by means of cyclopropane and oxygen by means of an endotracheal tube, and proved at the time a satisfactory anaesthetic. It was now that his burns were examined in detail. It was discovered that nearly half of his body surface was affected. The burns could be classified as superficial. They were cleansed with a one per cent aqueous solution of Cetavalon, and dried, covered with penicillin powder, tulle gras, dry gauze, cotton-wool, and bandages. His eyes were also examined by an eye-specialist to exclude burns of the eye itself. However the eye was not affected, only the area around it being affected.

The patient has thus had his burns treated in the general manner, as described under that of pressure dressings.

The pressure method is perhaps the most suitable type of treatment in this case because here we want to try and stop the exudation of plasma from the burnt areas, and perhaps prevent the shock from progressing. The exposure method would have been quite an undertaking in burns of such an extent, in a busy surgical ward, with septic cases around it, while coagulant or irrigation methods would have been the same, and the plaster technique would appear to be too risky.

The patient was shifted back to bed, plasma and saline drip being continued. His condition did not improve at all. He did not recover consciousness from the anaesthetic after the operation. The burnt areas began to swell, and became very marked.

Though he did not pass urine per urethra, a little was obtained on the passage of a catheter. His temperature rose steadily, and even when recorded immediately after the operation had risen two degrees. It continued to rise still further but fell once, as did the pulse, and respiratory rate which had increased too. However the temperature rose again, and the pulse became impalpable, and the apex beat had to be used. His respirations became more difficult and he died at eight-fifteen p.m.

We thus have a boy aged thirteen years, who was burnt by a flash of gunpowder. The burns on examination were superficial, which could be attributed to the fact that the flash of heat was of short duration, and that gas and steam are suddenly developed in the epidermis, and that this gaseous layer prevented any further penetration of the heat. It is to be noted however that on the palms of the hands, the burns were more severe. Here the opinion got on examination was that there was a detachment of the epidermis from the dermis, and further proof was that the epidermis could be peeled off from the dermis, like a glove. For the most part however he was protected by his clothes. The parts uncovered by his clothes were burned. His face was burned completely including his eyes, and at first it was feared that the eyes themselves were affected. His hair was almost absent, only a mass of frizzled burnt hair remaining, pointing to the severity of the heat. His hands and wrists got burned, his hands appearing the worst, as in all probability they were closest to the explosion, as he bent down to throw in the match. The legs showed burning mainly over the ankles, and feet and lower part of leg, though the thighs were clear due to the short trousers he was wearing. It is interesting to note that the upper part of his thighs, and scrotum were burnt. As to whether this occurred directly through the trouser cloth itself which did not appear apparent at the time, or if as he bent down the flash passed up his trouser legs, and yet did not burn the thighs, or a more likely thing is that the front of his trousers gapped a bit as he bent down. On admission he was fairly comatose, and it is likely from his appearance that secondary shock was appearing.

General shock therapy appeared to improve him to such an extent that he could talk with you, suggesting that though secondary shock may be present, most of his symptoms then were probably due to primary shock. His condition continued to improve with the intravenous transfusion of plasma. Up to this point treatment had been along general principles. He was taken to the theatre three hours after admission when his condition appeared satisfactory. The treatment carried out as previously mentioned appears very satisfactory for the extensive area of the burns, which was about fifty per cent of the body surface.

It is now that we come to the interesting part of the case. At this point the plasma was stopped, and saline was given. Surely in a case of burns where you have such a large surface laid bare, it would appear better to continue plasma even if has to be given slowly.

We must remember that no haemoglobin estimations were done, and thus the value of the plasma transfusion could not surely be properly assessed. Another factor arises here which would have been an interesting point, is that of what the result would have been, knowing what did happen to the case, if blood had been administered instead of plasma, or along with plasma. Would it have been more beneficial? It is doubtful to say, and it might have got the blame of what happened.

The patient never recovered from the anaesthetic at any time. It does happen with cyclopropane however that patients often appear to be out longer, and in a deeper sleep than those who have had ether. Thus here we have the patient not recovering from the anaesthetic. We can thus move in two directions - did the anaesthetic upset the patient's circulatory state, and combined with the interference at the burnt areas cause a slow irreversible change somewhere, or was there some other sudden change in the patient after the operation, that prevented him coming round, because he was conscious before the operation. He definitely points to a case of 'Acute Toxaemia', starting just over the six hours period. He has the increased temperature, pulse rate, respiratory rate, delirium, and decreased urinary output. As to the cause, and why it started so early it is difficult to state. One thing we can rule out is the absorption of a drug, as the drugs used were on the whole non-toxic, and did not have enough time to act anyway. I would be more inclined to favour a circulatory upset. As no post mortem was done we are unable to support our statements by pathological reports.

To complete this case on burns, I would like to consider the late treatment of burns, and also one or two other types of burns, such as burns of the eye, and inhalation burns, and also the complications of burns.

Four things can be done in the late treatment of severe burns.

1. Physiotherapy.
2. Rehabilitation.
3. Radiotherapy.
4. Plastic Repair.

Physiotherapy is used when a deep burn has healed but is still not very good in thickness for general use. During the end repair or the deep burn the tissues go through a phase of induration, and inelasticity before they soften, ready for safe usage. It is during this time that care must be taken about movement of the affected part, otherwise, blistering, cuticular haemorrhage, and ulceration occur. Olive oil may help the new epithelium if used early. Rehabilitation comes now. Here co-ordinated movements are encouraged, and occupational therapy is beneficial. The work must however be of the graded type. If Keloid formation occurs, radiotherapy with the use of x-rays, comes in. X-rays are regarded as essential before excising and grafting keloidal areas, and the best results are obtained if the dosage is heavy.

Plastic Surgery has been the biggest boom to people who have been burnt. With its aid many people have been able to face up to the world again. It should be postponed as long as possible after healing, though there are many occasions, when it is possible to do it when the case is admitted. A thick three-quarter skin-graft appears to be the best.

Burns of the eyes are usually confined to the lids due to the reflex contraction of them. Thus the eye-ball is very rarely burned. If it is burned paroline drops must be instilled at once with atropine. Irrigation of the eye is carried out with boracic lotion at frequent intervals. The complications which may arise are the formation of symblepharon.

Inhalation burns are caused by flame entering the mouth, and throat. If the lungs are affected, it is always fatal, but it rarely occurs. In any burn of this area, the patient is collapsed and a continuous supply of oxygen is needed. The mouth and throat are treated by repeated swabbing of the burned areas with glycerine and borax to remove the sticky fibrinous exudate which collects. If laryngeal obstruction is threatened, the throat is sprayed with adrenaline, and a tracheotomy done if needed. Oedema of the soft tissues of the neck is best treated by application of ice packs.

The complications of burns are many in number. They include:-

1. Primary neurogenic shock.
2. Secondary shock from fluid depletion.
3. Acute toxæmia.
4. Septic toxæmia.
5. Sloughing of the mucous membrane of the mouth, pharynx, and oesophagus, and sometimes oedema of the glottis in children who have been scalded while attempting to drink boiling fluid.
6. Tracheitis, bronchitis, pulmonary oedema, broncho - pneumonia, if flame has been inhaled.
7. Secondary hæmorrhage.
8. Injuries to nerve trunks.
9. Duodenal or even intestinal ulceration. (Curling's ulcer).
10. Fibrous contracture if flexor surfaces are burnt to a fourth degree.
11. Keloid especially in burns of the third or fourth degree.

Most of these complications have already been discussed in other parts of the discussion. However one or two have been missed.

Injuries to nerve-trunks vary in severity, and if severe recovery will be very slight. Duodenal ulceration is the occurrence of an ulcer in the duodenum thought to be due to histamine.

The prognosis in a case of burns is dependant upon several factors. The first is the nature of the burning agent. I think also in this should the length of time the agent has been present, and also as to how the agent had its effect. Thus we would not expect serious burning injuries from a match flame, but if you were caught in the flames from a petrol tank explosion, the burns would in all probability be severe. If an agent acts for a short time no great damage may be done, though certain agents can produce very severe burns in a short space of time, but even a simple burning agent, if given time will cause a severe burn. The agent may be only close at hand or it may be all over the person, as in a case where the clothes have caught fire.

The second factor is inclusive of the age, sex, and occupation of the patient. A very young child often stands up to a burn poorly, due to the relatively large proportion of body weight which can be lost in the fluid exudate, while at the other end of the scale we find old people succumbing easily to the shock, or a complication. The occupation of the patient may be affected a great deal by burns, prohibiting him from doing his work in a satisfactory manner. The third factor is that of the extent of the body surface affected. Here if over fifteen per cent of the body surface is affected it is severe, while if over fifty per cent the chances become very slight. The depth of the burn also plays a part as the deeper the burn is, the more difficult it is to heal, and when it does it may leave a deformity etc., and prohibit the person from the satisfactory use of say a limb. Thus we come to the site of the burn, which is very important because if the burn is say that of a limb, e.g. the hand, the patient may not be able to carry out his work.

The last factor is the presence or absence of complications. This is an important factor in the early stages, because where complications like acute toxæmia, or septicaemia occur, the prognosis may be very grave. The prognosis may thus be dependant upon several factors or on all of them.

Conclusion.

From this case we may perhaps be allowed to make certain conclusions. When the patient was first admitted, the appearance of the boy was such that he did not look a very severe case, and it was only later that on examination of the patient at operation, that we found that he had at least about fifty per cent of his body surface affected. Thus a case when it is first seen can be very deceiving. The patient though he appeared to recover from the shock before the operation, did not come round again after the operation.

I have already put forward certain views on this subject, but I would like to draw attention to the fact that after the patient was admitted, no haemoglobin estimations were done on him. His blood pressure was only recorded on admission too. Thus I think that there was no real support that the plasma and the saline, which was given to overcome the shock, was doing its duty satisfactory, as no check other than what would appear to be a visible one or by the pulse, was done.

The treatment of this case, other than the general treatment, followed definite lines. It would appear that the patient developed the symptoms of acute toxæmia too early to make out that drug absorption was the cause.

Exposure method in this case I think would have been a very difficult problem, and the pressure method a more satisfactory one.

Thus in a case of burns it would appear that the main thing to attack first in a patient with burns of any severity at all, is the general shock, and not to do anything to the burns other than an examination, and cover with a sterile cloth.
